



## NUCLEIC ACIDS AND PROTEINS FROM STREPTOCOCCUS PNEUMONIAE

The present invention relates to proteins derived from *Streptococcus pneumoniae*, nucleic acid molecules encoding such proteins, the use of the nucleic acid and/or proteins as antigens/immunogens and in detection/diagnosis, as well as methods for screening the proteins/nucleic acid sequences as potential anti-microbial targets.

*Streptococcus pneumoniae*, commonly referred to as the pneumococcus, is an important pathogenic organism. The continuing significance of *Streptococcus pneumoniae* infections in relation to human disease in developing and developed countries has been authoritatively reviewed (Fiber, G.R., *Science*, **265**: 1385-1387 (1994)). That indicates that on a global scale this organism is believed to be the most common bacterial cause of acute respiratory infections, and is estimated to result in 1 million childhood deaths each year, mostly in developing countries (Stansfield, S.K., *Pediatr. Infect. Dis.*, **6**: 622 (1987)). In the USA it has been suggested (Breiman *et al*, *Arch. Intern. Med.*, **150**: 1401 (1990)) that the pneumococcus is still the most common cause of bacterial pneumonia, and that disease rates are particularly high in young children, in the elderly, and in patients with predisposing conditions such as asplenia, heart, lung and kidney disease, diabetes, alcoholism, or with immunosuppressive disorders, especially AIDS. These groups are at higher risk of pneumococcal septicaemia and hence meningitis and therefore have a greater risk of dying from pneumococcal infection. The pneumococcus is also the leading cause of otitis media and sinusitis, which remain prevalent infections in children in developed countries, and which incur substantial costs.

The need for effective preventative strategies against pneumococcal infection is highlighted by the recent emergence of penicillin-resistant pneumococci. It has been reported that 6.6% of pneumococcal isolates in 13 US hospitals in 12 states were found to be resistant to penicillin and some isolates were also resistant to other antibiotics including third generation cyclosporins (Schappert, S.M., *Vital and Health Statistics of*

*the Centres for Disease Control/National Centre for Health Statistics*, **214**:1 (1992)).

The rates of penicillin resistance can be higher (up to 20%) in some hospitals (Breiman *et al*, J. Am. Med. Assoc., **271**: 1831 (1994)). Since the development of penicillin resistance among pneumococci is both recent and sudden, coming after decades during which penicillin remained an effective treatment, these findings are regarded as alarming.

For the reasons given above, there are therefore compelling grounds for considering improvements in the means of preventing, controlling, diagnosing or treating pneumococcal diseases.

Various approaches have been taken in order to provide vaccines for the prevention of pneumococcal infections. Difficulties arise for instance in view of the variety of serotypes (at least 90) based on the structure of the polysaccharide capsule surrounding the organism. Vaccines against individual serotypes are not effective against other serotypes and this means that vaccines must include polysaccharide antigens from a whole range of serotypes in order to be effective in a majority of cases. An additional problem arises because it has been found that the capsular polysaccharides (each of which determines the serotype and is the major protective antigen) when purified and used as a vaccine do not reliably induce protective antibody responses in children under two years of age, the age group which suffers the highest incidence of invasive pneumococcal infection and meningitis.

A modification of the approach using capsule antigens relies on conjugating the polysaccharide to a protein in order to derive an enhanced immune response, particularly by giving the response T-cell dependent character. This approach has been used in the development of a vaccine against *Haemophilus influenzae*, for instance. There are, however, issues of cost concerning both the multi-polysaccharide vaccines and those based on conjugates.

A third approach is to look for other antigenic components which offer the potential to be vaccine candidates. This is the basis of the present invention. Using a specially developed bacterial expression system, we have been able to identify a group of protein antigens from pneumococcus which are associated with the bacterial envelope or which are secreted.

Thus, in a first aspect the present invention provides a *Streptococcus pneumoniae* protein or polypeptide having a sequence selected from those shown in table 1.

In a second aspect, the present invention provides a *Streptococcus pneumoniae* protein or polypeptide having a sequence selected from those shown in table 2.

A protein or polypeptide of the present invention may be provided in substantially pure form. For example, it may be provided in a form which is substantially free of other proteins.

As discussed herein, the proteins and polypeptides of the invention are useful as antigenic material. Such material can be "antigenic" and/or "immunogenic". Generally, "antigenic" is taken to mean that the protein or polypeptide is capable of being used to raise antibodies or indeed is capable of inducing an antibody response in a subject. "Immunogenic" is taken to mean that the protein or polypeptide is capable of eliciting a protective immune response in a subject. Thus, in the latter case, the protein or polypeptide may be capable of not only generating an antibody response but, in addition, a non-antibody based immune response.

The skilled person will appreciate that homologues or derivatives of the proteins or polypeptides of the invention will also find use in the context of the present invention, ie as antigenic/immunogenic material. Thus, for instance proteins or polypeptides which include one or more additions, deletions, substitutions or the like are encompassed by the

present invention. In addition, it may be possible to replace one amino acid with another of similar "type". For instance replacing one hydrophobic amino acid with another.

One can use a program such as the CLUSTAL program to compare amino acid sequences. This program compares amino acid sequences and finds the optimal alignment by inserting spaces in either sequence as appropriate. It is possible to calculate amino acid identity or similarity (identity plus conservation of amino acid type) for an optimal alignment. A program like BLASTx will align the longest stretch of similar sequences and assign a value to the fit. It is thus possible to obtain a comparison where several regions of similarity are found, each having a different score. Both types of identity analysis are contemplated in the present invention.

In the case of homologues and derivatives, the degree of identity with a protein or polypeptide as described herein is less important than that the homologue or derivative should retain the antigenicity or immunogenicity of the original protein or polypeptide. However, suitably, homologues or derivatives having at least 60% similarity (as discussed above) with the proteins or polypeptides described herein are provided. Preferably, homologues or derivatives having at least 70% similarity, more preferably at least 80% similarity are provided. Most preferably, homologues or derivatives having at least 90% or even 95% similarity are provided.

In an alternative approach, the homologues or derivatives could be fusion proteins, incorporating moieties which render purification easier, for example by effectively tagging the desired protein or polypeptide. It may be necessary to remove the "tag" or it may be the case that the fusion protein itself retains sufficient antigenicity to be useful.

In an additional aspect of the invention there are provided antigenic/immunogenic fragments of the proteins or polypeptides of the invention, or of homologues or derivatives thereof.

For fragments of the proteins or polypeptides described herein, or of homologues or derivatives thereof, the situation is slightly different. It is well known that is possible to screen an antigenic protein or polypeptide to identify epitopic regions, ie those regions which are responsible for the protein or polypeptide's antigenicity or immunogenicity.

5 Methods for carrying out such screening are well known in the art. Thus, the fragments of the present invention should include one or more such epitopic regions or be sufficiently similar to such regions to retain their antigenic/immunogenic properties. Thus, for fragments according to the present invention the degree of identity is perhaps irrelevant, since they may be 100% identical to a particular part of a protein or  
10 polypeptide, homologue or derivative as described herein. The key issue, once again, is that the fragment retains the antigenic/immunogenic properties.

Thus, what is important for homologues, derivatives and fragments is that they possess at least a degree of the antigenicity/immunogenicity of the protein or polypeptide from  
15 which they are derived.

Gene cloning techniques may be used to provide a protein of the invention in substantially pure form. These techniques are disclosed, for example, in J. Sambrook *et al Molecular Cloning* 2nd Edition, Cold Spring Harbor Laboratory Press (1989). Thus,  
20 in a third aspect, the present invention provides a nucleic acid molecule comprising or consisting of a sequence which is:

- (i) any of the DNA sequences set out in Table 1 or their RNA equivalents;
- 25 (ii) a sequence which is complementary to any of the sequences of (i);
- (iii) a sequence which codes for the same protein or polypeptide, as those sequences of (i) or (ii);

(iv) a sequence which has substantial identity with any of those of (i), (ii) and (iii);

5 (v) a sequence which codes for a homologue, derivative or fragment of a protein as defined in Table 1.

In a fourth aspect the present invention provides a nucleic acid molecule comprising or consisting of a sequence which is:

10 (i) any of the DNA sequences set out in Table 2 or their RNA equivalents;

(ii) a sequence which is complementary to any of the sequences of (i);

15 (iii) a sequence which codes for the same protein or polypeptide, as those sequences of (i) or (ii);

(iv) a sequence which has substantial identity with any of those of (i), (ii) and (iii); or

20 (v) a sequence which codes for a homologue, derivative or fragment of a protein as defined in Table 2.

The nucleic acid molecules of the invention may include a plurality of such sequences, and/or fragments. The skilled person will appreciate that the present invention can  
25 include novel variants of those particular novel nucleic acid molecules which are exemplified herein. Such variants are encompassed by the present invention. These may occur in nature, for example because of strain variation. For example, additions, substitutions and/or deletions are included. In addition, and particularly when utilising microbial expression systems, one may wish to engineer the nucleic acid sequence by  
30 making use of known preferred codon usage in the particular organism being used for

expression. Thus, synthetic or non-naturally occurring variants are also included within the scope of the invention.

5 The term "RNA equivalent" when used above indicates that a given RNA molecule has a sequence which is complementary to that of a given DNA molecule (allowing for the fact that in RNA "U" replaces "T" in the genetic code).

10 When comparing nucleic acid sequences for the purposes of determining the degree of homology or identity one can use programs such as BESTFIT and GAP (both from the Wisconsin Genetics Computer Group (GCG) software package) BESTFIT, for example, compares two sequences and produces an optimal alignment of the most similar segments. GAP enables sequences to be aligned along their whole length and finds the optimal alignment by inserting spaces in either sequence as appropriate. Suitably, in the context of the present invention when discussing identity of nucleic acid sequences, the  
15 comparison is made by alignment of the sequences along their whole length.

Preferably, sequences which have substantial identity have at least 50% sequence identity, desirably at least 75% sequence identity and more desirably at least 90 or at least 95% sequence identity with said sequences. In some cases the sequence identity may be  
20 99% or above.

Desirably, the term "substantial identity" indicates that said sequence has a greater degree of identity with any of the sequences described herein than with prior art nucleic acid sequences.

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It should however be noted that where a nucleic acid sequence of the present invention codes for at least part of a novel gene product the present invention includes within its scope all possible sequence coding for the gene product or for a novel part thereof.

The nucleic acid molecule may be in isolated or recombinant form. It may be incorporated into a vector and the vector may be incorporated into a host. Such vectors and suitable hosts form yet further aspects of the present invention.

5 Therefore, for example, by using probes based upon the nucleic acid sequences provided herein, genes in *Streptococcus pneumoniae* can be identified. They can then be excised using restriction enzymes and cloned into a vector. The vector can be introduced into a suitable host for expression.

10 Nucleic acid molecules of the present invention may be obtained from *S.pneumoniae* by the use of appropriate probes complementary to part of the sequences of the nucleic acid molecules. Restriction enzymes or sonication techniques can be used to obtain appropriately sized fragments for probing.

15 Alternatively PCR techniques may be used to amplify a desired nucleic acid sequence. Thus the sequence data provided herein can be used to design two primers for use in PCR so that a desired sequence, including whole genes or fragments thereof, can be targeted and then amplified to a high degree.

20 Typically primers will be at least 15-25 nucleotides long.

As a further alternative chemical synthesis may be used. This may be automated. Relatively short sequences may be chemically synthesised and ligated together to provide a longer sequence.

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There is another group of proteins from *S.pneumoniae* which have been identified using the bacterial expression system described herein. These are known proteins from *S.pneumoniae*, which have not previously been identified as antigenic proteins. The amino acid sequences of this group of proteins, together with DNA sequences coding for them are shown in Table 3. These proteins, or homologues, derivatives and/or

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fragments thereof also find use as antigens/immunogens. Thus, in another aspect the present invention provides the use of a protein or polypeptide having a sequence selected from those shown in Tables 1-3, or homologues, derivatives and/or fragments thereof, as an immunogen/antigen.

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In yet a further aspect the present invention provides an immunogenic/antigenic composition comprising one or more proteins or polypeptides selected from those whose sequences are shown in Tables 1-3, or homologues or derivatives thereof, and/or fragments of any of these. In preferred embodiments, the

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immunogenic/antigenic composition is a vaccine or is for use in a diagnostic assay.

In the case of vaccines suitable additional excipients, diluents, adjuvants or the like may be included. Numerous examples of these are well known in the art.

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It is also possible to utilise the nucleic acid sequences shown in Tables 1-3 in the preparation of so-called DNA vaccines. Thus, the invention also provides a vaccine composition comprising one or more nucleic acid sequences as defined herein. DNA vaccines are described in the art (see for instance, Donnelly *et al* , *Ann. Rev. Immunol.*, **15**:617-648 (1997)) and the skilled person can use such art described techniques to produce and use DNA vaccines according to the present invention.

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As already discussed herein the proteins or polypeptides described herein, their homologues or derivatives, and/or fragments of any of these, can be used in methods of detecting/diagnosing *S.pneumoniae*. Such methods can be based on the detection of antibodies against such proteins which may be present in a subject. Therefore the present invention provides a method for the detection/diagnosis of *S.pneumoniae* which comprises the step of bringing into contact a sample to be tested with at least one protein, or homologue, derivative or fragment thereof, as described herein.

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Suitably, the sample is a biological sample, such as a tissue sample or a sample of blood or saliva obtained from a subject to be tested.

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In an alternative approach, the proteins described herein, or homologues, derivatives and/or fragments thereof, can be used to raise antibodies, which in turn can be used to detect the antigens, and hence *S.pneumoniae*. Such antibodies form another aspect of the invention. Antibodies within the scope of the present invention may be monoclonal or polyclonal.

Polyclonal antibodies can be raised by stimulating their production in a suitable animal host (e.g. a mouse, rat, guinea pig, rabbit, sheep, goat or monkey) when a protein as described herein, or a homologue, derivative or fragment thereof, is injected into the animal. If desired, an adjuvant may be administered together with the protein. Well-known adjuvants include Freund's adjuvant (complete and incomplete) and aluminium hydroxide. The antibodies can then be purified by virtue of their binding to a protein as described herein.

Monoclonal antibodies can be produced from hybridomas. These can be formed by fusing myeloma cells and spleen cells which produce the desired antibody in order to form an immortal cell line. Thus the well-known Kohler & Milstein technique (*Nature* **256** (1975)) or subsequent variations upon this technique can be used.

Techniques for producing monoclonal and polyclonal antibodies that bind to a particular polypeptide/protein are now well developed in the art. They are discussed in standard immunology textbooks, for example in Roitt *et al*, *Immunology* second edition (1989), Churchill Livingstone, London.

In addition to whole antibodies, the present invention includes derivatives thereof which are capable of binding to proteins etc as described herein. Thus the present invention includes antibody fragments and synthetic constructs. Examples of antibody fragments and synthetic constructs are given by Dougall *et al* in *Tibtech* **12** 372-379 (September 1994).

Antibody fragments include, for example, Fab, F(ab')<sub>2</sub> and Fv fragments. Fab fragments (These are discussed in Roitt *et al* [*supra*] ). Fv fragments can be modified to produce a synthetic construct known as a single chain Fv (scFv) molecule. This includes a peptide linker covalently joining V<sub>h</sub> and V<sub>l</sub> regions, which contributes to the stability of the molecule. Other synthetic constructs that can be used include CDR peptides. These are synthetic peptides comprising antigen-binding determinants. Peptide mimetics may also be used. These molecules are usually conformationally restricted organic rings that mimic the structure of a CDR loop and that include antigen-interactive side chains.

Synthetic constructs include chimaeric molecules. Thus, for example, humanised (or primatised) antibodies or derivatives thereof are within the scope of the present invention. An example of a humanised antibody is an antibody having human framework regions, but rodent hypervariable regions. Ways of producing chimaeric antibodies are discussed for example by Morrison *et al* in PNAS, **81**, 6851-6855 (1984) and by Takeda *et al* in Nature. **314**, 452-454 (1985).

Synthetic constructs also include molecules comprising an additional moiety that provides the molecule with some desirable property in addition to antigen binding. For example the moiety may be a label (e.g. a fluorescent or radioactive label). Alternatively, it may be a pharmaceutically active agent.

Antibodies, or derivatives thereof, find use in detection/diagnosis of *S.pneumoniae*. Thus, in another aspect the present invention provides a method for the detection/diagnosis of *S.pneumoniae* which comprises the step of bringing into contact a sample to be tested and antibodies capable of binding to one or more proteins described herein, or to homologues, derivatives and/or fragments thereof.

In addition, so-called "Affibodies" may be utilised. These are binding proteins selected from combinatorial libraries of an alpha-helical bacterial receptor domain

(Nord *et al* , ) Thus, Small protein domains, capable of specific binding to different target proteins can be selected using combinatorial approaches.

5 It will also be clear that the nucleic acid sequences described herein may be used to detect/diagnose *S.pneumoniae*. Thus, in yet a further aspect, the present invention provides a method for the detection/diagnosis of *S.pneumoniae* which comprises the step of bringing into contact a sample to be tested with at least one nucleic acid sequence as described herein. Suitably, the sample is a biological sample, such as a tissue sample or a sample of blood or saliva obtained from a subject to be tested. Such  
10 samples may be pre-treated before being used in the methods of the invention. Thus, for example, a sample may be treated to extract DNA. Then, DNA probes based on the nucleic acid sequences described herein (ie usually fragments of such sequences) may be used to detect nucleic acid from *S.pneumoniae*.

15 In additional aspects, the present invention provides:

(a) a method of vaccinating a subject against *S.pneumoniae* which comprises the step of administering to a subject a protein or polypeptide of the invention, or a derivative, homologue or fragment thereof, or an immunogenic composition of the  
20 invention;

(b) a method of vaccinating a subject against *S.pneumoniae* which comprises the step of administering to a subject a nucleic acid molecule as defined herein;

25 (c) a method for the prophylaxis or treatment of *S.pneumoniae* infection which comprises the step of administering to a subject a protein or polypeptide of the invention, or a derivative, homologue or fragment thereof, or an immunogenic composition of the invention;

30 (d) a method for the prophylaxis or treatment of *S.pneumoniae* infection which

comprises the step of administering to a subject a nucleic acid molecule as defined herein;

(e) a kit for use in detecting/diagnosing *S.pneumoniae* infection comprising one or more proteins or polypeptides of the invention, or homologues, derivatives or fragments thereof, or an antigenic composition of the invention; and

(f) a kit for use in detecting/diagnosing *S.pneumoniae* infection comprising one or more nucleic acid molecules as defined herein.

Given that we have identified a group of important proteins, such proteins are potential targets for anti-microbial therapy. It is necessary, however, to determine whether each individual protein is essential for the organism's viability. Thus, the present invention also provides a method of determining whether a protein or polypeptide as described herein represents a potential anti-microbial target which comprises antagonising, inhibiting or otherwise interfering with the function or expression of said protein and determining whether *S.pneumoniae* is still viable.

A suitable method for inactivating the protein is to effect selected gene knockouts, ie prevent expression of the protein and determine whether this results in a lethal change. Suitable methods for carrying out such gene knockouts are described in Li *et al* , *P.N.A.S.*, **94**:13251-13256 (1997) and Kolkman *et al* , **178**:3736-3741 (1996).

In a final aspect the present invention provides the use of an agent capable of antagonising, inhibiting or otherwise interfering with the function or expression of a protein or polypeptide of the invention in the manufacture of a medicament for use in the treatment or prophylaxis of *S.pneumoniae* infection.

As mentioned above, we have used a bacterial expression system as a means of

identifying those proteins which are surface associated, secreted or exported and thus, would find use as antigens.

5 The information necessary for the secretion/export of proteins has been extensively studied in bacteria. In the majority of cases, protein export requires a signal peptide to be present at the N-terminus of the precursor protein so that it becomes directed to the translocation machinery on the cytoplasmic membrane. During or after translocation, the signal peptide is removed by a membrane associated signal peptidase. Ultimately the localization of the protein (i.e. whether it be secreted, an integral membrane  
10 protein or attached to the cell wall) is determined by sequences other than the leader peptide itself.

We are specifically interested in surface located or exported proteins as these are likely to be antigens for use in vaccines, as diagnostic reagents or as targets for  
15 therapy with novel chemical entities. We have therefore developed a screening vector-system in *Lactococcus lactis* that permits genes encoding exported proteins to be identified and isolated. We provide below a representative example showing how given novel surface associated proteins from *Streptococcus pneumoniae* have been identified and characterized. The screening vector incorporates the staphylococcal  
20 nuclease gene *nuc* lacking its own export signal as a secretion reporter. Staphylococcal nuclease is a naturally secreted heat-stable, monomeric enzyme which has been efficiently expressed and secreted in a range of Gram positive bacteria (Shortle, *Gene*, **22**:181-189 (1983); Kovacevic *et al.*, *J. Bacteriol.*, **162**:521-528 (1985); Miller *et al.*, *J. Bacteriol.*, **169**:3508-3514 (1987); Liebl *et al.*, *J. Bacteriol.*, **174**:1854-1861 (1992);  
25 Le Loir *et al.*, *J. Bacteriol.*, **176**:5135-5139 (1994); Poquet *et al.*, *J. Bacteriol.*, **180**:1904-1912 (1998)).

Recently, Poquet *et al.* ((1998), *supra*) have described a screening vector incorporating the *nuc* gene lacking its own signal leader as a reporter to identify  
30 exported proteins in Gram positive bacteria, and have applied it to *L. lactis*. This

vector (pFUN) contains the pAM $\beta$ 1 replicon which functions in a broad host range of Gram-positive bacteria in addition to the ColE1 replicon that promotes replication in *Escherichia coli* and certain other Gram negative bacteria. Unique cloning sites present in the vector can be used to generate transcriptional and translational fusions between cloned genomic DNA fragments and the open reading frame of the truncated *nuc* gene devoid of its own signal secretion leader. The *nuc* gene makes an ideal reporter gene because the secretion of nuclease can readily be detected using a simple and sensitive plate test: Recombinant colonies secreting the nuclease develop a pink halo whereas control colonies remain white (Shortle, (1983), *supra*; Le Loir *et al.*, (1994), *supra*).

Thus, the invention will now be described with reference to the following representative example, which provides details of how the proteins, polypeptides and nucleic acid sequences described herein identified as antigenic targets.

We describe herein the construction of three reporter vectors and their use in *L. lactis* to identify and isolate genomic DNA fragments from *Streptococcus pneumoniae* encoding secreted or surface associated proteins.

The invention will now be described with reference to the examples, which should not be construed as in any way limiting the invention. The examples refer to the figures in which:

Figure 1: shows the results of a number of DNA vaccine trials; and

Figure 2: shows the results of further DNA vaccine trials.

#### EXAMPLE 1

##### (i) Construction of the pTREP1-nuc series of reporter vectors

(a) Construction of expression plasmid pTREP1

The pTREP1 plasmid is a high-copy number (40-80 per cell) theta-replicating gram positive plasmid, which is a derivative of the pTREX plasmid which is itself a  
 5 derivative of the previously published pIL253 plasmid. pIL253 incorporates the broad Gram-positive host range replicon of pAM $\beta$ 1 (Simon and Chopin, *Biochimie*, **70**:559-567 (1988)) and is non-mobilisable by the *L lactis* sex-factor. pIL253 also lacks the *tra* function which is necessary for transfer or efficient mobilisation by conjugative parent plasmids exemplified by pIL501. The Enterococcal pAM $\beta$ 1 replicon has previously  
 10 been transferred to various species including *Streptococcus*, *Lactobacillus* and *Bacillus* species as well as *Clostridium acetobutylicum*, (Oultram and Klaenhammer, *FEMS Microbiological Letters*, **27**:129-134 (1985); Gibson *et al.*, (1979); LeBlanc *et al.*, *Proceedings of the National Academy of Science USA*, **75**:3484-3487 (1978)) indicating the potential broad host range utility. The pTREP1 plasmid represents a  
 15 constitutive transcription vector.

The pTREX vector was constructed as follows. An artificial DNA fragment containing a putative RNA stabilising sequence, a translation initiation region (TIR), a multiple cloning site for insertion of the target genes and a transcription terminator was created  
 20 by annealing 2 complementary oligonucleotides and extending with Tfl DNA polymerase. The sense and anti-sense oligonucleotides contained the recognition sites for NheI and BamHI at their 5' ends respectively to facilitate cloning. This fragment was cloned between the XbaI and BamHI sites in pUC19NT7, a derivative of pUC19 which contains the T7 expression cassette from pLET1 (Wells *et al* , *J. Appl.*  
 25 *Bacteriol.*, **74**:629-636 (1993)) cloned between the EcoRI and HindIII sites. The resulting construct was designated pUCLEX. The complete expression cassette of pUCLEX was then removed by cutting with HindIII and blunting followed by cutting with EcoRI before cloning into EcoRI and SacI (blunted) sites of pIL253 to generate the vector pTREX (Wells and Schofield, *In Current advances in metabolism, genetics*  
 30 *and applications-NATO ASI Series*, **H 98**:37-62 (1996)). The putative RNA stabilising

sequence and TIR are derived from the *Escherichia coli* T7 bacteriophage sequence and modified at one nucleotide position to enhance the complementarity of the Shine Dalgarno (SD) motif to the ribosomal 16s RNA of *Lactococcus lactis* (Schofield *et al.* pers. coms. University of Cambridge Dept. Pathology.).

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A *Lactococcus lactis* MG1363 chromosomal DNA fragment exhibiting promoter activity which was subsequently designated P7 was cloned between the EcoRI and BglII sites present in the expression cassette, creating pTREX7. This active promoter region had been previously isolated using the promoter probe vector pSB292

10 (Waterfield *et al.*, *Gene*, **165**:9-15 (1995)). The promoter fragment was amplified by PCR using the Vent DNA polymerase according to the manufacturer.

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The pTREP1 vector was then constructed as follows. An artificial DNA fragment which included a transcription terminator, the forward pUC sequencing primer, a promoter multiple -cloning site region and a universal translation stop sequence was created by annealing two overlapping partially complementary synthetic

oligonucleotides together and extending with sequenase according to manufacturers instructions. The sense and anti-sense (pTREP<sub>F</sub> and pTREP<sub>R</sub>) oligonucleotides

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contained the recognition sites for EcoRV and BamHI at their 5' ends respectively to facilitate cloning into pTREX7. The transcription terminator was that of the *Bacillus penicillinase* gene, which has been shown to be effective in *Lactococcus* (Jos *et al.*, *Applied and Environmental Microbiology*, **50**:540-542 (1985)). This was considered

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necessary as expression of target genes in the pTREX vectors was observed to be leaky and is thought to be the result of cryptic promoter activity in the origin region (Schofield *et al.* pers. coms. University of Cambridge Dept. Pathology.). The forward pUC primer sequencing was included to enable direct sequencing of cloned DNA fragments. The translation stop sequence which encodes a stop codon in 3 different frames was included to prevent translational fusions between vector genes and cloned DNA fragments. The pTREX7 vector was first digested with EcoRI and blunted using

30 the 5' - 3' polymerase activity of T4 DNA polymerase (NEB) according to

manufacturer's instructions. The EcoRI digested and blunt ended pTREX7 vector was then digested with Bgl II thus removing the P7 promoter. The artificial DNA fragment derived from the annealed synthetic oligonucleotides was then digested with EcoRV and Bam HI and cloned into the EcoRI(blunted)-Bgl II digested pTREX7 vector to generate pTREP. A *Lactococcus lactis* MG1363 chromosomal promoter designated P1 was then cloned between the EcoRI and BglII sites present in the pTREP expression cassette forming pTREP1. This promoter was also isolated using the promoter probe vector pSB292 and characterised by Waterfield *et al.*, (1995), *supra*. The P1 promoter fragment was originally amplified by PCR using vent DNA polymerase according to manufacturers instructions and cloned into the pTREX as an EcoRI-BglII DNA fragment. The EcoRI-BglII P1 promoter containing fragment was removed from pTREX1 by restriction enzyme digestion and used for cloning into pTREP (Schofield *et al.* pers. coms. University of Cambridge, Dept. Pathology.).

**(b) PCR amplification of the *S. aureus* nuc gene.**

The nucleotide sequence of the *S. aureus* nuc gene (EMBL database accession number V01281) was used to design synthetic oligonucleotide primers for PCR amplification. The primers were designed to amplify the mature form of the nuc gene designated nucA which is generated by proteolytic cleavage of the N-terminal 19 to 21 amino acids of the secreted propeptide designated Snase B (Shortle, (1983), *supra*). Three sense primers (nucS1, nucS2 and nucS3, Appendix 1) were designed, each one having a blunt-ended restriction endonuclease cleavage site for EcoRV or SmaI in a different reading frame with respect to the nuc gene. Additionally BglII and BamHI were incorporated at the 5' ends of the sense and anti-sense primers respectively to facilitate cloning into BamHI and BglII cut pTREP1. The sequences of all the primers are given in Appendix 1. Three nuc gene DNA fragments encoding the mature form of the nuclease gene (NucA) were amplified by PCR using each of the sense primers combined with the anti-sense primer described above. The nuc gene fragments were amplified by PCR using *S. aureus* genomic DNA template, Vent DNA Polymerase

(NEB) and the conditions recommended by the manufacturer. An initial denaturation step at 93 °C for 2 min was followed by 30 cycles of denaturation at 93 °C for 45 sec, annealing at 50 °C for 45 seconds, and extension at 73 °C for 1 minute and then a final 5 min extension step at 73 °C. The PCR amplified products were purified using a Wizard clean up column (Promega) to remove unincorporated nucleotides and primers.

### (c) Construction of the pTREP1-nuc vectors

The purified nuc gene fragments described in section b were digested with Bgl II and BamHI using standard conditions and ligated to BamHI and BglII cut and dephosphorylated pTREP1 to generate the pTREP1-nuc1, pTREP1-nuc2 and pTREP1-nuc3 series of reporter vectors. General molecular biology techniques were carried out using the reagents and buffer supplied by the manufacture or using standard conditions (Sambrook and Maniatis, (1989), *supra*). In each of the pTREP1-nuc vectors the expression cassette comprises a transcription terminator, lactococcal promoter P1, unique cloning sites (BglII, EcoRV or SmaI) followed by the mature form of the nuc gene and a second transcription terminator. Note that the sequences required for translation and secretion of the nuc gene were deliberately excluded in this construction. Such elements can only be provided by appropriately digested foreign DNA fragments (representing the target bacterium) which can be cloned into the unique restriction sites present immediately upstream of the *nuc* gene.

In possessing a promoter, the pTREP1-nuc vectors differ from the pFUN vector described by Poquet *et al.* (1998), *supra*, which was used to identify *L. lactis* exported proteins by screening directly for Nuc activity directly in *L. lactis*. As the pFUN vector does not contain a promoter upstream of the *nuc* open reading frame the cloned genomic DNA fragment must also provide the signals for transcription in addition to those elements required for translation initiation and secretion of Nuc. This limitation

may prevent the isolation of genes that are distant from a promoter for example genes which are within polycistronic operons. Additionally there can be no guarantee that promoters derived from other species of bacteria will be recognised and functional in *L. lactis*. Certain promoters may be under stringent regulation in the natural host but not in *L. lactis*. In contrast, the presence of the P1 promoter in the pTREP1-nuc series of vectors ensures that promoterless DNA fragments (or DNA fragments containing promoter sequences not active in *L. lactis*) will still be transcribed.

**(d) Screening for secreted proteins in *S. pneumoniae***

Genomic DNA isolated from *S. pneumoniae* was digested with the restriction enzyme Tru9I. This enzyme which recognises the sequence 5'- TTAA -3' was used because it cuts A/T rich genomes efficiently and can generate random genomic DNA fragments within the preferred size range (usually averaging 0.5 - 1.0 kb). This size range was preferred because there is an increased probability that the P1 promoter can be utilised to transcribe a novel gene sequence. However, the P1 promoter may not be necessary in all cases as it is possible that many Streptococcal promoters are recognised in *L. lactis*. DNA fragments of different size ranges were purified from partial Tru9I digests of *S. pneumoniae* genomic DNA. As the Tru 9I restriction enzyme generates staggered ends the DNA fragments had to be made blunt ended before ligation to the EcoRV or SmaI cut pTREP1-nuc vectors. This was achieved by the partial fill-in enzyme reaction using the 5'-3' polymerase activity of Klenow enzyme. Briefly Tru9I digested DNA was dissolved in a solution (usually between 10-20 µl in total) supplemented with T4 DNA ligase buffer (New England Biolabs; NEB) (1X) and 33 µM of each of the required dNTPs, in this case dATP and dTTP. Klenow enzyme was added (1 unit Klenow enzyme (NEB) per µg of DNA) and the reaction incubated at 25°C for 15 minutes. The reaction was stopped by incubating the mix at 75°C for 20 minutes. EcoRV or SmaI digested pTREP-nuc plasmid DNA was then added (usually between 200-400 ng). The mix was then supplemented with 400 units of T4 DNA ligase (NEB)

and T4 DNA ligase buffer (1X) and incubated overnight at 16°C. The ligation mix was precipitated directly in 100% Ethanol and 1/10 volume of 3M sodium acetate (pH 5.2) and used to transform *L. lactis* MG1363 (Gasson, 1983). Alternatively, the gene cloning site of the pTREP-nuc vectors also contains a BglII site which can be used to clone for example Sau3AI digested genomic DNA fragments.

*L. lactis* transformant colonies were grown on brain heart infusion agar and nuclease secreting (Nuc<sup>+</sup>) clones were detected by a toluidine blue-DNA-agar overlay (0.05 M Tris pH 9.0, 10 g of agar per litre, 10 g of NaCl per liter, 0.1 mM CaCl<sub>2</sub>, 0.03% wt/vol. salmon sperm DNA and 90 mg of Toluidine blue O dye) essentially as described by Shortle, 1983, *supra* and Le Loir *et al.*, 1994, *supra*). The plates were then incubated at 37°C for up to 2 hours. Nuclease secreting clones develop an easily identifiable pink halo. Plasmid DNA was isolated from Nuc<sup>+</sup> recombinant *L. lactis* clones and DNA inserts were sequenced on one strand using the NucSeq sequencing primer described in Appendix 1, which sequences directly through the DNA insert.

### **Isolation of Genes Encoding Exported Proteins from *S. pneumoniae***

A large number of gene sequences putatively encoding exported proteins in *S. pneumoniae* have been identified using the nuclease screening system. These have now been further analysed to remove artefacts. The sequences identified using the screening system have been analysed using a number of parameters.

1. All putative surface proteins were analysed for leader/signal peptide sequences using the software programs Sequencher (Gene Codes Corporation) and DNA Strider (Marck, *Nucleic Acids Res.*, **16**:1829-1836 (1988)). Bacterial signal peptide sequences share a common design. They are characterised by a short positively charged N-terminus (N region) immediately preceding a stretch of hydrophobic residues (central portion-h region) followed by a more polar C-terminal portion which contains the cleavage site (c-region). Computer software is available

which allows hydropathy profiling of putative proteins and which can readily identify the very distinctive hydrophobic portion (h-region) typical of leader peptide sequences. In addition, the sequences were checked for the presence of or absence of a potential ribosomal binding site (Shine-Dalgarno motif) required for translation initiation of the putative nuc reporter fusion protein.

2. All putative surface protein sequences were also matched with all of the protein/DNA sequences using the publicly databases [OWL-proteins inclusive of SwissProt and GenBank translations]. This allows us to identify sequences similar to known genes or homologues of genes for which some function has been ascribed. Hence it has been possible to predict a function for some of the genes identified using the LEEP system and to unequivocally establish that the system can be used to identify and isolate gene sequences of surface associated proteins. We should also be able to confirm that these proteins are indeed surface related and not artifacts. The LEEP system has been used to identify novel gene targets for vaccine and therapy.

3. Some of the genes identified proteins did not possess a typical leader peptide sequence and did not show homology with any DNA/protein sequences in the database. Indeed these proteins may indicate the primary advantage of our screening method, i.e. the isolation of atypical surface-related proteins, which may have been missed in all previously described screening protocols or approaches based on sequence homology searches.

In all cases, only partial gene sequences were initially obtained. Full length genes were obtained in all cases by reference to the TIGR *S.pneumoniae* database ([www@tigr.org](http://www.tigr.org)). Thus, by matching the originally obtained partial sequences with the database, we were able to identify the full length gene sequences. In this way, as described herein, three groups of genes were clearly identified, ie a group of genes encoding previously unidentified *S.pneumoniae* proteins, a second group exhibiting some homology with known proteins from a variety of sources and a third group which encoded known *S.pneumoniae* proteins, which were, however, not known as antigens.

## **Example 2: Vaccine trials**

### **pcDNA3.1+ as a DNA vaccine vector**

#### **pcDNA3.1+**

The vector chosen for use as a DNA vaccine vector was pcDNA3.1 (Invitrogen) (actually pcDNA3.1+, the forward orientation was used in all cases but may be referred to as pcDNA3.1 here on). This vector has been widely and successfully employed as a host vector to test vaccine candidate genes to give protection against pathogens in the literature (Zhang, *et al.*, Kurar and Splitter, Anderson *et al.*). The vector was designed for high-level stable and non-replicative transient expression in mammalian cells. pcDNA3.1 contains the ColE1 origin of replication which allows convenient high-copy number replication and growth in *E. coli*. This in turn allows rapid and efficient cloning and testing of many genes. The pcDNA3.1 vector has a large number of cloning sites and also contains the gene encoding ampicillin resistance to aid in cloning selection and the human cytomegalovirus (CMV) immediate-early promoter/enhancer which permits efficient, high-level expression of the recombinant protein. The CMV promoter is a strong viral promoter in a wide range of cell types including both muscle and immune (antigen presenting) cells. This is important for optimal immune response as it remains unknown as to which cells types are most important in generating a protective response *in vivo*. A T7 promoter upstream of the multiple cloning site affords efficient expression of the modified insert of interest and which allows *in vitro* transcription of a cloned gene in the sense orientation.

Zhang, D., Yang, X., Berry, J. Shen, C., McClarty, G. and Brunham, R.C. (1997) "DNA vaccination with the major outer-membrane protein genes induces acquired immunity to *Chlamydia trachomatis* (mouse pneumonitis) infection". *Infection and Immunity*, **176**, 1035-40.

Kurar, E. and Splitter, G.A. (1997) "Nucleic acid vaccination of *Brucella abortus* ribosomal *L7/L12* gene elicits immune response". *Vaccine*, **15**, 1851-57.

Anderson, R., Gao, X.-M., Papakonstantinopoulou, A., Roberts, M. and Dougan, G. (1996) "Immune response in mice following immunisation with DNA encoding fragment C of tetanus toxin". *Infection and Immunity*, **64**, 3168-3173.

### **Preparation of DNA vaccines**

Oligonucleotide primers were designed for each individual gene of interest derived using the LEEP system. Each gene was examined thoroughly, and where possible,

primers were designed such that they targeted that portion of the gene thought to encode only the mature portion of the gene protein. It was hoped that expressing those sequences that encode only the mature portion of a target gene protein, would facilitate its correct folding when expressed in mammalian cells. For example, in the majority of cases primers were designed such that putative N-terminal signal peptide sequences would not be included in the final amplification product to be cloned into the pcDNA3.1 expression vector. The signal peptide directs the polypeptide precursor to the cell membrane via the protein export pathway where it is normally cleaved off by signal peptidase I (or signal peptidase II if a lipoprotein). Hence the signal peptide does not make up any part of the mature protein whether it be displayed on the surface of the bacteria surface or secreted. Where an N-terminal leader peptide sequence was not immediately obvious, primers were designed to target the whole of the gene sequence for cloning and ultimately, expression in pcDNA3.1.

Having said that, however, other additional features of proteins may also affect the expression and presentation of a soluble protein. DNA sequences encoding such features in the genes encoding the proteins of interest were excluded during the design of oligonucleotides. These features included:

1. LPXTG (SEQ ID NO: 182) cell wall anchoring motifs.
2. LXXC (SEQ ID NO: 197) lipoprotein attachment sites.
3. Hydrophobic C-terminal domain.
4. Where no N-terminal signal peptide or LXXC (SEQ ID NO: 197) was present the start codon was excluded.
5. Where no hydrophobic C-terminal domain or LPXTG (SEQ ID NO: 182) motif was present the stop codon was removed.

Appropriate PCR primers were designed for each gene of interest and any and all of the regions encoding the above features was removed from the gene when designing these primers. The primers were designed with the appropriate enzyme restriction site followed by a conserved Kozak nucleotide sequence (in most cases (NB except in occasional instances for example ID59) GCCACC was used. The Kozak sequence facilitates the recognition of initiator sequences by eukaryotic ribosomes) and an ATG start codon upstream of the insert of the gene of interest. For example the forward primer using a BamHI site the primer would begin GCGGGATCCGCCACCATG (SEQ ID NO: 183) followed by a small section of the 5' end of the gene of interest. The reverse primer was designed to be compatible with the forward primer and with a NotI restriction site at the 5' end in most cases (this site is TTGCGGCCGC) (SEQ ID NO: 184) (NB except in occasional instances for example ID59 where a XhoI site was used instead of NotI).

### **PCR primers**

The following PCR primers were designed and used to amplify the truncated genes of interest.

#### ID5

5

Forward Primer (SEQ ID NO: 185)

5' CGGATCCGCCACCATGGGTCTAATTGAAGACTTAAAAAATCAA 3'

Reverse Primer (SEQ ID NO: 186)

10 5' TTGCGGCCGCAATGCTAGACTAAACACAAGACTCA 3'

#### ID59

Forward Primer (SEQ ID NO: 187)

15 5' CGCGGATCCATGAAAAAATCTATTCATTTTATAGCA 3'

Reverse Primer (SEQ ID NO: 188)

5' CCCTCGAGGGCTACTTCCGATACATTTTAAACTGTAGG 3'

20 ID51

Forward Primer (SEQ ID NO: 189)

5' CGGATCCGCCACCATGAGTCATGTCGCTGCAAATG 3'

Reverse Primer (SEQ ID NO: 190)

25 5' TTGCGGCCGCATACCAAACGCTGACATCTACG 3'

#### ID29

Forward Primer (SEQ ID NO: 191)

30 5' CGGATCCGCCACCATGCAAAAAGAGCGGTATGGTTATG 3'

Reverse Primer (SEQ ID NO: 192)

5' TTGCGGCCGCACCCCCATTCTTAATCCCTT 3'

#### ID50

35

Forward Primer (SEQ ID NO: 193)

5' CGGATCCGCCACCATGGAGGTATGTGAAATGTCACGTAAA 3'

Reverse Primer (SEQ ID NO: 194)

5' TTGCGGCCGCTTTTACAAAGTCAAGCAAAGCC 3'

40

### Cloning

The insert along with the flanking features described above was amplified using PCR against a template of genomic DNA isolated from type 4 *S. pneumoniae* strain 11886

A strain of type 4 was used in cloning and challenge methods which is the strain from which the *S. pneumoniae* genome was sequenced. A freeze dried ampoule of a homogeneous laboratory strain of type 4 *S. pneumoniae* strain NCTC 11886 was obtained from the National Collection of Type Strains. The ampoule was opened and the cultured re suspended with 0.5 ml of tryptic soy broth (0.5% glucose, 5% blood). The suspension was subcultured into 10 ml tryptic soy broth (0.5% glucose, 5% blood) and incubated statically overnight at 37°C. This culture was streaked on to 5% blood agar plates to check for contaminants and confirm viability and on to blood agar slopes and the rest of the culture was used to make 20% glycerol stocks. The slopes were sent to the Public Health Laboratory Service where the type 4 serotype was confirmed.

25 A glycerol stock of NCTC 11886 was streaked on a 5% blood agar plate and incubated overnight in a CO<sub>2</sub> gas jar at 37°C. Fresh streaks were made and optochin sensitivity was confirmed.

30 A standard inoculum of type 4 *S. pneumoniae* was prepared and frozen down by passing a culture of pneumococcus 1x through mice, harvesting from the blood of infected animals, and grown up to a predetermined viable count of around  $10^9$  cfu/ml in broth before freezing down. The preparation is set out below as per the flow chart.

v

v

40 Vaccine trials in mice were carried out by the administration of DNA to 6 week old CBA/ca mice (Harlan, UK). Mice to be vaccinated were divided into groups of six and each group was immunised with recombinant pcDNA3.1+ plasmid DNA containing a specific target-gene sequence of interest. A total of 100 µg of DNA in Dulbecco's PBS (Sigma) was injected intramuscularly into the tibialis anterior muscle of both legs (50 µl in each leg). A boost was carried using the same procedure 4 weeks later. For

comparison, control groups were included in all vaccine trials. These control groups were either unvaccinated animals or those administered with non-recombinant pcDNA3.1+ DNA (sham vaccinated) only, using the same time course described above. 3 weeks after the second immunisation, all mice groups were challenged intranasally with a lethal dose of *S. pneumoniae* serotype 4 (strain NCTC 11886). The number of bacteria administered was monitored by plating serial dilutions of the inoculum on 5% blood agar plates. A problem with intranasal immunisations is that in some mice the inoculum bubbles out of the nostrils, this has been noted in results table and taken account of in calculations. A less obvious problem is that a certain amount of the inoculum for each mouse may be swallowed. It is assumed that this amount will be the same for each mouse and will average out over the course of inoculations. However, the sample sizes that have been used are small and this problem may have significant effects in some experiments. All mice remaining after the challenge were killed 3 or 4 days after infection. During the infection process, challenged mice were monitored for the development of symptoms associated with the onset of *S. pneumoniae* induced-disease. Typical symptoms in an appropriate order included piloerection, an increasingly hunched posture, discharge from eyes, increased lethargy and reluctance to move. The latter symptoms usually coincided with the development of a moribund state at which stage the mice were culled to prevent further suffering. These mice were deemed to be very close to death, and the time of culling was used to determine a survival time for statistical analysis. Where mice were found dead, the survival time was taken as the last time point when the mouse was monitored alive.

### **Interpretation of Results**

A positive result was taken as any DNA sequence that was cloned and used in challenge experiments as described above which gave protection against that challenge. Protection was taken as those DNA sequences that gave statistically significant protection (to a 95% confidence level ( $p < 0.05$ )) and also those which were marginal or close to significant using Mann-Whitney or which show some protective features for example there were one or more outlying mice or because the time to the first death was prolonged. It is acceptable to allow marginal or non-significant results to be considered as potential positives when it is considered that the clarity of some of the results may be clouded by the problems associated with the administration of intranasal infections.

## Results

**Trials 1-6 (see figure 1)**

Mouse number	Mean survival times (hours)						1
	Unvacc control (1)	pcDNA 3.1+ (1)	ID5 (1)	Unvacc control (2)	ID59 (2)	Unvacc control (5)	
1	47.5	61.0	61.0	49.0	55.0	58.0	
2	57.0	47.5	61.0	51.0	55.0	75.0	
3	47.5	50.5	57.0	49.0	55.0	48.0	
4	47.5	50.5	72.0	55.0	69.5	46.7	
5	77.0	72.0	47.5	49.0	74.0	58.0	
6	57.0	50.5	mouse died	49.0	mouse died	75.0	
<b>Mean</b>	<b>55.6</b>	<b>55.3</b>	<b>59.7</b>	<b>50.3</b>	<b>61.7</b>	<b>60.1</b>	
<b>sd</b>	<b>11.5</b>	<b>9.4</b>	<b>8.8</b>	<b>2.4</b>	<b>9.3</b>	<b>12.5</b>	
<b>p value 1</b>	-	-	<b>0.1722</b>	-	<b>0.0064</b>	-	
<b>p value 2</b>	-	-	<b>0.2565</b>	-	-	-	

\* - bubbled when dosed so may not have received full inoculum.

- 5 T - terminated at end of experiment having no symptoms of infection.  
 Numbers in brackets - survival times disregarded assuming incomplete dosing  
 p value 1 refers to significance tests compared to unvaccinated controls  
 p value 2 refers to significance tests compared to pcDNA3.1+ vaccinated controls

### 10 Statistical Analyses.

Trial 1 - None of the other groups had significantly longer survival times than the controls. The survival times of the unvaccinated and pcDNA3.1 control groups were not significantly different. One of the mice from ID5 was an outlying result and the mean survival times for ID5 were extended but not significantly so.

- 15 Trial 2 - The group vaccinated with ID59 had significantly longer survival times than the unvaccinated control group.

Trial 5 - The group vaccinated with ID59 again survived for an average of almost 10 hours longer than the controls but the results were not quite statistically significant.

Trial 6 - The group vaccinated with ID51 did not have survival times significantly higher than unvaccinated controls ( $p < 36.0$ ), however, there were 2 outlying mice in the vaccinated group.

5 **Vaccine trials 7 and 8 (See figure 2)**

<b>Mouse number</b>	<b>Mean survival times (hours)</b>			
	<b>Unvacc control (7)</b>	<b>ID29 (7)</b>	<b>Unvacc control (8)</b>	<b>ID50 (8)</b>
1	59.6	73.1	45.1	60.6
2	47.2	54.8	50.8	60.6
3	59.6	59.3	60.4	51.1
4	70.9	54.8*	55.2	60.6
5	68.6*	59.3	45.1	60.6
6	76.0	54.8	45.1	60.6
<b>Mean</b>	<b>63.6</b>	<b>59.35</b>	<b>50.2</b>	<b>59.1</b>
<b>sd</b>	<b>10.3</b>	<b>7.1</b>	<b>6.4</b>	<b>3.9</b>
<b>p value 1</b>	-	<b>&lt;39.0</b>	-	<b>0.0048</b>

\* - bubbled when dosed so may not have received full inoculum.

T - terminated at end of experiment having no symptoms of infection.

10 Numbers in brackets - survival times disregarded assuming incomplete dosing  
p value 1 refers to significance tests compared to unvaccinated controls

Statistical Analyses.

Trial 7 - The ID29 vaccinated group showed prolonged times to the first death. T

15 Trial 8 - The group vaccinated with ID50 survived significantly longer than unvaccinated controls.

**Appendix I - Oligonucleotide primers**

nucS1

Bgl II Eco RV

5 5'- cgagatctgatatctcacaaacagataacggcgtaaatag -3' (SEQ ID NO: 171)

nucS2

Bgl II Sma I

10 5'- gaagatcttccccgggatcacaaacagataacggcgtaaatag -3' (SEQ ID NO: 172)

nucS3

Bgl II Eco RV

15 5'- cgagatctgatatccatcacaaacagataacggcgtaaatag -3' (SEQ ID NO: 173)

nucR

Bam HI

5'- cgggacccttatggacctaatacagcggtgtc -3' (SEQ ID NO: 174)

NucSeq

20 5'- ggatgctttgttcaggtgtatc -3' (SEQ ID NO: 175)

pTREP<sub>F</sub>25 5'- catgatatcggtacctcaagctcatatcattgtccggcaatggtgtgggctttttgttttagcggataa  
caatttcacac -3' (SEQ ID NO: 176)pTREP<sub>R</sub>5'- gcggatcccccgggcttaattaatgtttaaacactagtcgaagatctcgcaattctcctgtgtgaaatt  
gttatccgcta -3' (SEQ ID NO: 177)30 pUC<sub>F</sub>

5'- cgccagggttttccagtcacgac -3' (SEQ ID NO: 178)

V<sub>R</sub>

35 5'- tcaggggggcgagcctatg -3' (SEQ ID NO: 179)

V<sub>I</sub>

5'- tcgtatgttgtggaattgtg -3' (SEQ ID NO: 180)

V<sub>2</sub>

5'- tccggctcgtatgttgtgtggaattg -3' (SEQ ID NO: 181)

TABLE 1

5	<b>ID4 1200 bp</b>
	(SEQ ID NO: 1) ATGAGAAATATGTGGGTTGTAATCAAGGAAACCTATCTTCGACATGTCGAGTCATGGAGTTTCTTCTTTATGGTGAT TTCGCCGTTCTCTTTTAGGAATCTCTGTAGGAATTGGGCATCTCCAAGGTTCTTCTATGGCTAAAAATAATAAAG TGGCAGTAGTGACAACAGTGCCATCTGTAGCAGAAGGACTGAAGAATGTAATGGTGTTAACTTCGACTATAAAG ACGAAGCAAGTGCCAAAGAAGCAATTAAAGAAAGAAAAATTAAGGTTATTTGACCATTTGATCAAGAAGATAGTG TTCTAAAGGCAGTTTATCATGGCGAAACATCGCTTGAAAATGGAATTAATTTGAGGTTACAGGTACACTCAATGA ACTGCAAAATCAGCTTAATCGTTCAACTGCTTCCTTGCTCTCAAGAGCAGGAAAAACGCTTAGCGCAGACAATTCAA TTCACAGAAAAGATTGATGAAGCCAAGGAAAAATAAAAGTTTATTCAACAATTGCAGCAGGTGCCCTTAGGATTCT TTCTTTATATGATTCTGATTACCTATGCGGGTGTAACAGCTCAGGAAGTTGCCAGTGAAAAAGGCACCAAAATTAT GGAAGTCGTTTTTTCTAGCATAAGGGCAAGTCACTATTCTATGCGCGGATGATGGCTCTGTTTCTAGTGATTTTAA CGCATATTGGGATCTATGTTGTAGGTGGTCTGGCTGCCGTTTTGCTCTTAAAGATTTGCCATTCTTGGCTCAGTCTG GTATTTTGGATCACTTGGGAGATGCTATCTCACTGAATACCTTGCTCTTATTTTGATCAGTCTTTTCATGTACGTAG TCTTGGCAGCCTTCTAGGATCTATGGTTTCTCGTCTGAGGACTCAGGGAAAAGCCTTGTCGCCCTTTGATGATTTTG ATTATGGGTGGTTTTTTTGGAGTGACAGCTCTAGGTGCAGCTGGTGACAATCTCCTCTTGAAGATTGGTTCTTATAT TCCCTTTATTTGCACCTTCTTTATGCCGTTTCGAACGATTAATGACTATGCGGGGGAGCAGAAGCATGGATTTCAC TTGCTATTACAGTATTTTGGGTGGTAGCAACAGGATTTATCGGACGCATGTATGCTAGTCTCGTTCTTCAAACG GATGATTTAGGGATTGGAAAACCTTTAAACGTGCCTTATCTTATAAATAG
25	(SEQ ID NO: 2) MRNMWVVIKETYLRHVESWSFFFMVISPFLLGISVIGIHLQSSMAKNNKVAVVTTVPSVAEGLKNVNGVNFYKDE ASAKEAIKEEKLKGYLTIDQEDSVLKAVYHGETSLENGIKFEVTGTLNELQNQLNRSTASLSQEKEKRLAQTIQFTEKIDE AKENKKFIQTIAAGALGFFLYMILITYAGVTAQEVASEKGTKIMEVVFSIRASHYFYARMMALFLVILTHIGIYVVGGLA AVLLFKDLPFLAQSGILDHLGDAISLNTLLFILISLFMYVVLAAFLGSMVSRPEDSGKALSPLMILIMGGFFGVLTALGAAG DNLLLKIGSYIPFISTFFMPFRTINDYAGGAEAWISLAITVIFAVVATGFIGRMYASLVLTQDLDGIWKTFRKALSYK
30	<b>ID5 1125 bp</b>
35	(SEQ ID NO: 3) CCTGGGAAAGTCTTGAAAATTATGATAGAAATGGTGGAAGGAAAAATTCAGGAGAGTAGTAGTGACTCAAAATGTT GAAAGTCTTCTCGTATCCATTGTAATCAGTGCATACAATGAAGAAAAATATCTGCCTGGTCTAATTGAAGACTTAA AAAATCAAACCTATCTAAAGAGGATATTGAAATTTCTATTTATAAATGCTATGTCCACAGATGGGACCACAGCTAT CATTGACGAATTTATAAAGGAAGATACAGAGTTAACTCAATTAGATTGTATAACAATCCTAAGAAAAATCAAGCT AGTGGTTTTAACTGGGAGTTAAACATTCTGTAGGGGACCTTATTTAAAAATTGATGCTCATTCAAAAAGTTACTGA GACTTTTGAATGAACAATGTGGCTATTATTCAACAAGGTGAATTTGTCTGTGGGGGGCCTAGACCGACGATTGTC GAAGGAAAAAGGAAAAATGGGCAGAGACCTTGCATCTTGTGTAGGAAAAATATGTTTGGCAGTAGCATTGCCAATTAT CGAAATAGTTCTGAGGATAGATATGTTTCTTCTATTTTTCATGGAATGTATAAACGAGAGGTTTTCCAGAAGGTTGG TTTAGTAAATGAGCAACTTGGCCGAAGTGAAGATAATGATATTCAATTATAGAAATTCGAGAATATGGTTATAAAATC CGCTATAGCCCAAGTATTCTATCTTATCAGTATATTCGACCAACATTCAAGAAAAATGCTGCATCAAAAAGTATTCAA ATGGTTTGTGGATTGGCTTGACAAGTCATGTTCAAGTTAAGTGTTTATCATTATTTCACTATGTTCTTGTATTATTG TTTGAGTCTTGTGTTTAGTCTAGCATTGTTACCGATCACATTCGATTTCATAACTTTACTATTAGGTGCCTATTTTCT ACTTTTGTCAATTACTCACTTTGCTGACTTTATTAACATAAAAAATGGATTTCATAATTGTGATGCCCTTTATTTTATT TTCCATTCACTTTGCTTATGGCCTTGGGACGATTGTAGGTTTAAATAGAGGATTTAAATGGAAGAAGGAGTACAAG AGAACAATAATTTATTTGGATAAAATAAGCCAAATAAATCAAAATATGCTATAA
50	(SEQ ID NO: 4) PGKVLKIMIEWWKEKFRRVVVTQNVESLLVSIVISAYNEEKYLPGLIEDLKNQTPKEDIEILFINAMSTDGTTAIIQQFIK EDTEFNSIRLYNNPKKNQASGFNLGVKHSVGDILKIDAHSKVTETFMNNVAVIIQQGEFVCGGPRPTIVEGKGKWAETL HLVEENMFGSSIANYRNSSEDRYVSSIFHGMKYKREVFQKVLVNEQLGRTEENDIHYRIREYGYKIRYSPLSYQYIRPT FKKMLHQKYSNGLWIGLTSHVQFKCLSLFHYVPCFLVLSLVFSLALLPITFVFITLLLGAYFLLLSLLTLLTLLKHKNGLI VMPFILFSIHFAVGLGTIVGLIRGFKWKKEYKRTIHYLDKISQINQNML
55	<b>ID11 696 bp</b>
60	(SEQ ID NO: 5) ATGATGAAAGAACAAAATACGATAGAAAATCGATGTATTTCGAATTAGTTAAAAGCTTGTGGAACGCAAGCTAATG ATTTTAATAGTGGCACTTGTGACAGGTGCGGGGGCTTTTGCATATAGCACTTTTATTGTTAAGCCAGAATATACGAG TACCACGCGAATTTACGTAGTGAATCGCAATCAAGGAGACAAGCCGGGGTTGACAAAATCAGGATTTCAGGCGAGG AACTATCTGGTAAAGACTACCGTGAGATTATCCTTTCCGAGGATGTTTTGGAGGAAGTTTGTCTTGAATTGAAAC TAGATTTGACGCCAAAAGGTTTGGCTAATAAAATTAAGTGACAGTACCAGTTGATACCCGATTGTCTCTATTTC GTTAATGATCGAGTTCTGAAGAGGCAAGCCGATCGCTAACTCTTGAGAGAAGTAGCTGCTCAAAAAATTATCA
65	

GTATTACTCGTGTCTTCTGACGTGACAACACTGGAGGAGGCAAGGCCGCGATATCCCCGCTTCGCCAAATATTAA  
ACGCAATACACTAATTGGTTTTTTGGCAGGGGTGATTGGAAGTGTGTTATAGTTCTTCATCTTGAACTTTTGGATA  
CTCGTGTGAAACGTCCGGAAGATATCGAAAATACATTGCAGATGACACTTTTGGGAGTTGTGCCAACTTGGGTAA  
GTTGAAATAG

(SEQ ID NO: 6)

MMKEQNTIEIDVFQLVKSLWKRKLMILIVALVTGAGAFAYSTFIVKPEYTSSTRIYVVRNRNQGDKPGLTNQDLQAGTYL  
VKDYREIILSQDVLVEEVVSDLKLDLTPKGLANKIKVTVPVDTRIVSISVNDRVPEEASRIANSREVAQAQKIIISITRVSDVTT  
LEEAPPAISPSPNIKRNTLIGFLAGVIGTSVIVLHLELLDTRVKRPEDIENTLQMTLLGVVPLGKLLK

#### **ID19 555 bp**

(SEQ ID NO: 7)

ATGGTAAAAGTAGCAGTTATATTAGCTCAGGGCTTTGAAGAAATTGAAGCCTTGACAGTTGTAGATGTCTTGCCTC  
GAGCCAATATCACATGTGATATGGTTGGTTTTGAAGAGCAAGTAACGGGTTTCGCATGCAATCCAAGTAAGAGCAG  
ATCATGTCTTTGATGGAGATTTATCAGACTATGATATGATTGTTCTTCTGGAGGTATGCCTGGTTCTGCACATTTAC  
GTGATAATCAGACCTTGATTCAAGAAATTGCAAAGCTTCGAGCAAGAAGGGAAGAACTAGCAGCCATTTGTGCGG  
CACCAATTGCCCTCAATCAAGCAGAGATATTGAAAAATAAGCGATACACTTGTATGACGGCGTTCAAGAGCAAAT  
CCTTGATGGTCACTACGTCAAGGAAACAGTAGTGGTAGATGGTCAGTTGACAACCAGTCGGGGTCCTTCAACAGCC  
CTTGCCCTTTGCCTACGAGTTGGTGGAGCAACTAGGAGGGGACGCAGAGAGTTTACGAACAGGAATGCTCTATCGAG  
ATGTCTTTGGTAAAAATCAGTAA

(SEQ ID NO: 8)

MVKVAVILAQGFEEIEALTVDVLRANITCDMVGFEQVTSQSHAIQVRADHVFDGDLSDYDMIVLPGGMPGSAHLRD  
NQTLIELQSFEGEGKKLAAICAAPIALNQAEILKNKRYTCYDGVQEQILDGHYVKETVVVDGQLTTSRGPSTALAFAYE  
LVEQLGGDAESLRTGMLYRDVFGKNQ

#### **ID27 306 bp**

(SEQ ID NO: 9)

GTGGTAGGGATGGTAGAACCAAACTAGAAAGCCTTATAAAAGATCTTTACAATCATGCTCGACATGATTTGAGTG  
AAGATTTAGTTGCTGCTCTCTAGAGACTACTAAAAAAGTGCCTACTACAAATGAGCAATTGCAGGCAGTTTCGTCT  
CTCAGGCCTGGTCAATCGTGAATTGCTCCTAAATCCCAAACATCCAGCACCTGAGTTGCTCAACTTGGCTCGCTTTG  
TCAAAAGAGAAGAAGCCAAGTACAGAGGAAGTGCAGCTTCTGCGCTTATGTATGAGGAACTCTTTAAATGCTTTG  
A

(SEQ ID NO: 10)

MVGMVEPNLESLIKDLYNHARHDLSEDLVAALLETTKKLPTTNEQLQAVRLSGLVNRELLNPKHPAPELLNLARFVKR  
EEAKYRGATATSALMYEELFKML

#### **ID29 945 bp**

(SEQ ID NO: 11)

TTGTTCTTAAAAAGGAAAGAGAGGTAATCAGCATGCGTAAATGGACAAAAGGATTTCTCATCTTTGGTGTGGTGA  
CTACCGTTATCGGCTTTATCCTGCTTTTGTAGGTATCCAATCTGACGGGAITAAGAGCCTACTTTCCATGTCCAAAG  
AACCTGTCTATGATAGCCGTACGGAAGGCTAACCTTTGGCAAGGAAGTCGAAAACCTAGAAATTAATCTCCACCA  
ACACACGCTCACCATCACAGACTCTTTCGATGATCAAAATCCACATTTCTTACCATCCATCTCTTCTGCTCACCATG  
ATCTTATACCAATCAGAACGATAGAACTCTGAGTCTCACTGATAAGAACTGTCTGAAACTCCGTTTCTCTCTTCT  
GGAATTGGTGGGATTCTTCATATCGCAAGTAGTACTCTAGTCGTTTTGAAGAAGTTATTCTCCGACTACCAAAAGG  
GAGAACTCTAAAAGGGATCAACATCTCAGCCAATCGCGGACAAACCACCATCATAAATGCTAGCCTTGAAAATGC  
GACCCTCAATACAAACAGCTATATCCTCCGAATTGAAGGAAGTCGTATCAAAAACAGTAAACTCACAACGCCCAAT  
ATCGTTAATATCTTTGATACAGTTCTTACAGATAGTCAGCTAGAGTCAACAGAGAATCACTTCCACGCTGAAAATA  
TCCAAGTCCATGGCAAGGTTGAACTGACTGCCAAAGATTATCTCAGAATCATCCTAGACCAGAAAAGAAAGCCAAC  
GAATTAAGTGGGACATCTCAAGCAACTATGGTTCTATCTTCCAATTCACAAGAGAAAAGCCTGAATCAAGAGGTAC  
GGAATTAAGCAACCCCTTACAAAAGTGA AAAAACCGATGTCAAGGATCAACTCATTGCGAGATCTGATGATAATATT  
GATCTAATATCCACACCAAGCAGACGTTGA

(SEQ ID NO: 12)

MFLKKEREVISMRKWTGFLIFGVVTTVIGFILLFVGIQSDGIKSLLSMSKEPVYDSRTEKLTGKEVENLEITLHQHTLT  
TDSFDDQIHISYHPSLSAHHDLTINQNDRTLSTDKKLSETPFLSSGIGILHIASSYSSRFEEVILRLPKGRTLKGINISANR  
GQTTIINASLENATLNTNSYILRIEGRISKNKSLTTPNIVNIFDVTLDTSQLESTENHFHAENIQVHGKVELTAKDYLRIL  
QKESQRINWDISSNYGSIFQFTREKPEISRGTELSNPYKTEKTDVKDQLIARSDDNIDLISTPSRR

#### **ID30 879 bp**

(SEQ ID NO: 13)



DKEALSNLNLQIENGEMGLIGHNGAGKSTTIKSLVSIHSPSSGRILVDGQELSENRLAIKRKIGYVADSPDLFLRLTANEF  
WELIASSYDLRSRDLEASLARLLNVDFEAENRYQVIETLSHGMQRQKVVFVIGALLSDPDIWVLDEPLTGLDPQAAFDLKQ  
MMKEHAQKQKTVLFSHVLEVAEQVCDRIAILKKGHLYCGKVEDLRKDHPDQSLESIYLSLAGRKEEVADASQGH

5 **ID112 360 bp**

(SEQ ID NO: 21)

ATGGCTTTGTTTTAGAGAGAGGAGCAGTACGGAAGACACCAATGGCAAGTCCAATAATGAGACCTATGATGGTTC  
CGACGATAGAGATTAAAAGAGTGATACCAGCACCGCAAGAGTTGTTGCCAGTTTTAGAAAAGAAATTTAGCAA  
CTTGGCTAAAGAACTACTGCTAGTCTCTTCAGTTGTTGTAGCTTCGGCAGGTTGTTCTTATGATCATACGATCCATC  
10 AAGGCAACTTGGTCATCTTTTGAATGGTTTCAATGCTGGCATTGATTGGCTAATACGATTGTCATTTTACGAAG  
CCCGATAGCGATAGCTGTATCTTCTCCCAAGTTTGAACCAGGTTCTACTTGA

(SEQ ID NO: 22)

MALFSERGAVRKTPMASPIMRPMVPTIEIKRVIPAPRKSCCQFSEIRLATWLKLLLLVSSVVVASAGCSLIIRSIKATWSS  
15 FEMVSMALILIWLIRLSFLRSPIAIAVSSSPVLKPGST

**ID 128 - 3.43**

(SEQ ID NO: 23)

ATGAAATTTAGTAAAAATATATAGCAGCTGGATCAGCTGTTATCGTATC  
CTTGAGTCTATGTGCCTATGCACTAAACCAGCATCGTTCGAGGAAAAATA  
AGGACAATAATCGTGTCTCTTATGTGGATGGCAGCCAGTCAAGTCAGAAA  
AGTGAAGAACTTGACACCAAGAGGTTAGCCAGAAAGAAAGGAATTCAGGC  
TGAGCAAAATTGTAATCAAAATTACAGATCAGGGCTATGTAACGTCACACG  
25 GTGACCACTATCATTACTATAATGGGAAAGTTCCCTTATGATGCCCTCTTT  
AGTGAAGAACTCTTGATGAAGGATCCAACTATCAACTTAAAGACGCTGA  
TATTGTCAATGAAGTCAAGGGTGGTTATATCATCAAGGTCGATGGAAAAAT  
ATTATGTCTACCTGAAAGATGCAGCTCATGCTGATAATGTTTCAAACTAAA  
GATGAAATCAATCGTCAAAAAACAAGAACATGTCAAAGATAATGAGAAGGT  
30 TAAGTCTAATGTTGCTGTAGCAAGGTCTCAGGGACGATATACGACAAATG  
ATGGTTATGTCTTTAATCCAGCTGATATTATCGAAGATACGGGTAATGCT  
TATATCGTTCTCATGGAGGTCATCACTACATTCCTCAAAAGCGATT  
ATCTGCTAGTGAATTAGCAGCAGCTAAAGCACATCTGGCTGGAAAAATA  
TGCAACCGAGTCAGTTAAGCTATTCTTCAACAGCTAGTGACAATAACACG  
35 CAATCTGTAGCAAAAGGATCAACTAGCAAGCCAGCAATAAATCTGAAAA  
TCTCCAGAGTCTTTTGAAGGAACTCTATGATTACCTAGCGCCCAACGTT  
ACAGTGAATCAGATGGCCTGGTCTTTGACCCTGCTAAGATTATCAGTCGT  
ACACCAAATGGAGTTGCGATTCCGCATGGCGACCATACCACTTTATTCC  
TTACAGCAAGCTTTCTGCCTTAGAAGAAAAAGATTGCCAGAAATGGTGCTTA  
40 TCAGTGGAACTGGTTCTACAGTTCTACAAATGCAAAACCTAATGAAGTA  
GTGCTAGTCTAGGCAGTCTTCAAGCAATCCTTCTTCTTAAACGACAAG  
TAAGGAGCTCTCTCAGCATCTGATGGTTATATTTTAAATCCAAAAGATA  
TCGTTGAAGAAACGGCTACAGCTTATATTGTAAGACATGGTGATCATTTT  
45 CATTACATTCAAAAATCAAAATCAAAATGGGCAACCGACTTCCAAACAA  
TAGTCTAGCAACACCTTCTCCATCTCTTCCAATCAATCCAGGAACCTCAC  
ATGAGAAACATGAAGAAGATGGATACGGATTTGATGCTAATCGTATTATC  
GCTGAAGATGAATCAGGTTTGTGTCATGAGTCACGGAGACCACAATCATT  
TTTCTTCAAGAAAGACTTGACAGAAGAGCAAATTAAGGTGCGCAAAAAACA  
50 TTTAG

(SEQ ID NO: 24)

MKFSKKYIAAGSAVIVSLSLCAYALNQHRSEQENKDNRRVSYVDGSQSSQK  
SENLTDPQVSQKEGIAEQIVIKITDQGYVTSHGDHYHYNGKVPYDALF  
SEELLMKDPNYQLKDADIVNEVKGGYIIVKVDGKYVYVLKDAHADNVRTK  
55 DEINRQKQEHVKDNEKVNSNVAVARSQGRYTTNDGYVFNPAIIEDTGNA  
YIVPHGGHYHYIPKSDLSASELAAKAHLAAGKMNQPSQLSYSSTASDNNT  
QSVAKGSTKPAKSENLSLLKELYDSPAQRYSSEDLVFDPAKIISR  
TPNGVAIPHGDHYHFIPYSKLSALEEKIARMVPISGTGSTVSTNAKPNEV  
VSSLGSLSSNPSSLTTSKELSSASDGYIFNPKDIVEETATAYIVRHGDHF  
60 HYIPKSNQIGQPTLPNNSLATPSPSLPINPGTSHEKHEEDGYGFDANRII  
AEDESFGVMHSHGDHNYFFKKDLTEEQIKVRKNI\*

TABLE 2

**ID2 840 bp**

5 (SEQ ID NO: 25)  
 ATGGGAATTGCTCTAGAAAAATGTGAATTTTACATATCAAGAAGGTAAGTCCCTTAGCTTCAGCAGCTTTGTCGGATGT  
 TTCTTTGACGATTGAAGATGGCTCTTATACAGCTTTAATTGGGCACACAGGTAAGTGGTAAATCAACTATTTTACAAC  
 10 TCTTAAATTTGCTTATTTGTTGCCAAGTCAAGGAGTGTGAGGGTTTGTATACCTTAATCACCTCGACTTCTAAAAAT  
 AAAGATATTCGTCAAATAGAAAAACAGGTTGGCTTGGTATTTTCAAGTTTGTGCTGAAAAATCAGATTTTGAAGAAACGG  
 TTTTGAAGGACGTTGCTTTTGGACCGCAAAATTTTGGAGTTTCTGAAGAAGATGCTGTGAAGACTGCGCGTGAGAA  
 ACTGGCTCTGGTTGGAATTGATGAATCACTTTTTGATCGTAGTCCGTTTGAAGTGTGACGGGGGACAAATGAGACGT  
 GTTGCCATTGACGGCATACTTGCCATGGAGCCAGCTATATTAGTCTTAGATGAGCCAACAGCTGGTCTAGATCCTCT  
 15 AGGGAGAAAAGAGTTGATGACCCTGTCAAAAACTCCACCAGTCAGGGATGACCATCGTCTTGGTAACGCATTTG  
 ATGGATGATGTTGCTGAATATGCGAATCAAGTCTATGTAATGGAAGGGACGTTTAGTAAAGGGGGGCAACCA  
 AGTGATGTCTTTCAAGACGTTGTTTTATGGAAGAAGTTCAGTTGGGAGTACCTAAAATTACGGCCTTTTGTAAACG  
 ATTGGCTGATAGAGCGGTGTCATTTAAACGATTACCGATTAAAGATAGAGGAGTTCAAGGAGTCGCTAAATGGATAG

(SEQ ID NO: 26)  
 20 MGIALENVNFYQEGTPLASAAALSDVSLTIEDGSYALIGHTSGSKSTILQLLNGLLVPSQGSVRVFDLTITSTSKNKDIRQ  
 IRKQVGLVFPQAFENQIFEETVLKDVAFGPQNFVSEEDAVKTAREKLALVGIDESLFDSPFELSGGQMRRVAIAGILAM  
 EPAILVLDEPTAGLDPLGRKELMTLFLKHLHQSGMTIVLVTHLMDDVAEYANQVYVMEKGRVLVKGKPSDVFQDVVFM  
 EEVQLGVPKITAFCKRLADRGVSFKRLPIKIEEFKESLNG

**ID 3 6360 bp**

25 (SEQ ID NO: 27)  
 TACCCGGTAGTCTTAGCAGACACATCTAGCTCTGAAGATGCTTTAAACATCTCTGATAAAGAAAAAGTAGCAGAAA  
 ATAAAGAGAAACATGAAAAATATCCATAGTGCTATGGAACCTTCACAGGATTTTAAAGAGAAAGAAAAACAGCAGTCA  
 30 TTAAGGAAAAAGAAAGTTGTTAGTAAAAATCCTGTGATAGACAATAACACTAGCAATGAAGAAGCAAAATCAAAG  
 AAGAAAAATGCCAATAAATCCCAAGGAGATTATACGGACTATTTTGTGAATAAAAAACAGAAAAATCCCAAAAAAG  
 AAGATAAAGTTGTCTATATTGCTGAATTTAAAGATAAAGAATCTGGAGAAAAAGCAATCAAGGAACTATCCAGTCT  
 TAAGAAATACAAAAGTTTTATATACTTATGATAGAATTTTTAACGGTAGTGCCATAGAAACAACCTCCAGATAACTTG  
 GACAAAAATTAACAAATAGAAGGTATTTTCATCGGTTGAAAGGGCACAAAAAGTCCAACCCATGATGAATCATGCC  
 35 AGAAAGGAAATTTGGAAGTTGAGGAAGCTATTGATTACCTAAAGTCTATCAATGCTCCGTTTGGGAAAAATTTTGATG  
 GTAGAGGTATGGTCATTTCAAATATCGATACTGGAACAGATTATAGACATAAGGCTATGAGAATCGATGATGATGC  
 CAAAGCCTCAATGAGATTTAAAAAAGAGACTTAAAGGGCACTGATAAAAAATTATGGTTGAGTGATAAAATCCC  
 TCATGCGTTCAATTATTATAATGGTGGCAAAATCACTGTAGAAAAATATGATGATGGAAGGGATTATTTTGACCCA  
 CATGGGATGCATATTGCAGGGATTCTTGCTGGAATGATACTGAACAAGACATCAAAAACTTTAACGGCATAGATG  
 40 GAATTGCACCTAATGCACAAAATTTTCTCTTACAAAATGTATTCTGACGCAGGATCTGGGTTTGCGGGTGATGAAAC  
 AATGTTTCATGCTATTGAAGATTCTATCAAAACACAACGTTGATGTTGTTTCGGTATCATCTGGTTTTACAGGAACAG  
 GTCCTTGTAAGTGAGAAATATTGGCAAGCTATTCGGGCATTAAAGAAAAGCAGGCAATTCGAATGTTTGGTTCGCTACGGG  
 TAACTATGCGACTTCTGCTTCAAGTTCTTCATGGGATTTAGTAGCAATAATCATCTGAAAATGACCGACACTGGA  
 45 AATGTAACACGAACTGCAGCACATGAAGATGCGATAGCGGTGCGTTCTGCTAAAAATCAAAACAGTTGAGTTTGATA  
 AAGTTAACATAGGTGGAGAAAGTTTAAATACAGAAATATAGGGGCTTTTTCGATAAGAGTAAAAATCACAACAA  
 ATGAAGATGGAACAAAAGCTCCTAGTAAATTTAAATTTGTATATATAGGCAAGGGGCAAGACCAAGATTTGATAG  
 GTTTGGATCTTAGGGGCAAAATTCAGTAATGGATAGAATTTATACAAAGGATTTAAAAAATGCTTTTAAAAAAGC  
 50 TATGGATAAGGGTGCACGCGCCATTATGGTTGTAATACTGTAAATTAATACTACAATAGAGATAAATGGACAGAGCTT  
 CCAGCTATGGGATATGAAGCGGATGAAGGTACTAAAAGTCAAGTGTTTTCAATTTCAAGGAGATGATGGTGTAAAGC  
 TATGGAACATGATTAATCCTGATAAAAAAACTGAAGTCAAAAGAAATAATAAAGAAGATTTTAAAGATAAATTTGG  
 AGCAATACTATCCAATTGATATGGAAGTTTAAATTTCCAACAAACCGAATGTAGGTGACGAAAAAGAGATTGACTT  
 55 TAAGTTTGACCTGACACAGACAAAGAACTCTATAAAGAAGATATCATCTGTTCCAGCAGGATCTACATCTTGGGGG  
 CCAAGAAATAGATTTACTTTTAAACCCGATGTTTCAGCACCTGGTAAAAATATTAATCCACGCTTAATGTTATTAA  
 TGGCAATCAACTTATGGCTATATGTCAGGAAGTATGTCGAGTCCAAATCGTGGCAGCTTCTACTGTTTTGATTA  
 GACCGAAATTAAGGAAATGCTTGAAGACCTGTATTGAAAAATCTTAAGGGAGATGACAAAAATAGATCTTACAA  
 60 GTCTTACAAAAATTTGCCCTACAAAATCTGCGCGACCTATGATGGATGCAACTTCTTGGAAAGAAAAAAGTCAATA  
 CTTTGCATCACCTAGACAACAGGGAGCAGGCCTAATTAATGTGGCCAATGCTTTGAGAAATGAAGTTGTAGCAACT  
 TTCAAAAAACACTGATTCTAAAGGTTTGGTAAACTCATATGGTTCCATTTCTCTTAAAGAAATAAAAGGTGATAAAA  
 AATACTTTACAATCAAGCTTCACAATACATCAAAACAGACCTTTGACTTTTAAAGTTTCAGCATCAGCGATAACTACA  
 65 GATTCTCTAACTGACAGATTAAAACTTGATGAAACATATAAAGATGAAAAATCTCCAGATGGTAAGCAAAATTTGTT  
 CAGAAATTCACCCAGAAAAAGTCAAAAGGAGCAAAATATCACATTTGAGCATGATACTTTCACTATAGGGCGAAATTC  
 TAGCTTTGATTTGAATGCGGTTATAAATGTTGGAGAGGGCAAAAAACAAAAATAAATTTGTAGAATCATTTATTTCAT  
 TTTGAGTCAGTGGGAGCGATGGAAGCTCTAACTCCAGCGGGAAGAAAAATAAACTTCCAACTTCTTTGTCGATGC  
 CTCTAATGGGATTTGCTGGGAATTGGAACACGAACCAATCCTTGATAAATGGGCTTGGGAAGAAGGGTCAAGATC  
 AAAAAACACTGGGAGGTTATGATGATGATGGTAAACCGAAAAATCCAGGAACCTTAAATAAGGGAATTTGGTGGAGA  
 ACATGGTATAGATAAATTTAATCCAGCAGGAGTTATACAAAATAGAAAAGATAAAAAATACAACATCCCTGGATCA  
 AAATCCAGAATTATTGCTTTCAATAACGAAGGGATCAACGCTCCATCATCAAGTGGTTCTAAGATTGCTAACATTT

ATCCTTTAGATTCAAATGGAAATCCTCAAGATGCTCAACTTGAAAGAGGATTAACACCTTCTCCACTTGTATTAAGA  
 AGTGCAGAAGAAGGATTGATTTCAATAGTAAATACAAATAAGAGGGAGAAAATCAAAGAGACTTAAAAGTCATT  
 TCGAGAGAACACTTTATTAGAGGAATTTTAAATCTAAAAGCAATGATGCAAAAGGGAATCAAAATCATCTAAACTAA  
 5 AAGTTTGGGGTGACTTGAAGTGGGATGGACTCATCTATAATCCTAGAGGTAGAGAAGAAAATGCACCAGAAAAGTA  
 AGGATAATCAAGATCCTGCTACTAAGATAAGAGGTCAATTTGAACCGATTGCGGAAGGTCAATATTTCTATAAAAT  
 TAAATATAGATTAATAAAGATTACCCATGGCAGGTTTCTATATTCCTGTAAAAATTGATAACACCGCCCCCTAAG  
 ATTGTTTCGGTTGATTTTCAAATCCTGAAAAAATTAAGTTGATTACAAAGGATACTTATCATAAGGTAAAAGATCA  
 GTATAAGAATGAAACGCTATTTGCGAGAGATCAAAAAGAACATCCTGAAAAATTTGACGAGATTGCGAACGAAAT  
 10 TTGGTATGCTGGCGCCGCTCTTGTAAATGAAGATGGAGAGGTTGAAAAAAATCTTGAAGTAACCTACGCAGGTGAG  
 GGTCAAGGAAGAAATAGAAAACCTTGATAAAGACGGAAATACCATTTATGAAATTAAGGTGCGGGAGATTTAAGG  
 GGAAAAATCAATTGAAGTCATTGCATTAGATGGTTCTAGCAATTTACAAAGATTATAGAAATTAATTTGCTAATC  
 AGGCTGATGAAAAGGGGATGATTCCTATTATCTAGTAGTCTGATCAAGATTCATCTAAATATCAAAAGCTTGG  
 CGAGATTGCAGAACTCTAAATTTAAAAATTTAGGAAATGGAAAAGAGGGTAGTCTAAAAAAGATACAACCTGGGGT  
 15 AGAACATCATCATCAAGAAAAATGAAGAGTCTATTAAAGAAAAATCTAGTTTACTATTGATAGAAATATTTCAACA  
 ATTAGAGACTTTGAAAAATAAGACTTAAAGAACTCATTAAAAAGAAATTTAGAGAAGTTGATGATTTTACAAGTG  
 AAACCTGGTAAGGAAATGGAGGAATACGATTATAAATACGATGATAAAGGAAATATAAAGGAAATATAGATGGGA  
 CTGATCTAGAATATGAAACTGAGAACTTGACGAAATCAAAATCAAAAATTTATGGTGTCTAAGTCCGTCTAAAGA  
 TGGACACTTTGAAATCTTGGAAAGATAAGTAATGTTTCTAAAAATGCCAAGGTATATTATGGGAATAACTATAAA  
 TCTATAGAAATCAAAGCGACCAAGTATGATTTCCACTCAAAACGATGACATTTGATCTATACGCTAATATTAATG  
 20 ATATTGGGATGGATTAGCTTTTGCAGGAGATAGATGATTATTTGTTAAAGATAATGATCAGAAAAAGCTGAAAT  
 TAAAAATTAGAATGCCTGAAAAAATTAAGGAACTAAATCAGAATATCCCTATGTATCAAGTTATGGGAATGTCATA  
 GAATTAGGGGAAGGAGATCTTTCAAAAAACAACACAGACAATTTAACTAAAAATGGAATCTGGTAAAAATCTATTCT  
 GATTTCAGAAAAACAACAATATCTGTTAAAGGATAATATCAATCTTAAGAAAAAGGCTATGCATCAAAAGTCACTCT  
 ATAATCCTGGAAAAACGGATATGTTAGAAGGAAATGGAGTCTATAGCAAGGAAGATATAGCAAAAAATACAAAAG  
 25 GCCAATCCTAATCTAAGAGCCCTTTTCAGAAACAACAATTTATGCTGATAGTAGAAATGTTGAAGATGGAAGAAGTA  
 CCCAATCTGATTAAATGTCGGCTTTGGACGGCTTTAACATTATAAGGTATCAAGTGTTTACATTTAAAAATGAACGAT  
 AAAGGGGAAGCTATCGATAAAGACGGAAATCTTGTGACAGATCTTCTAAACTGTATTATTTGGTAAGGATGATA  
 AAGAATACACTGGAGAGGATAAGTTCAATGTAGAAGCTATAAAGAAGATGGCTCCATGTTATTTATTGATACCAA  
 ACCAGTAAACCTTTCAATGGATAAGAACTACTTTAATCCATCTAAATCTAATAAAATTTATGTACGAAATCCAGAA  
 30 TTTTATTTAAGAGTAAGATTTCTGATAAGGGTGGTTTAACTGGGAATTGAGAGTTAATGAATCGGTTGTAGATA  
 ATTATTTAATCTACGGAGATTTACACATTGATAACACTAGAGATTTTAAATTAAGCTGAATGTTAAAGACGGTGA  
 CATCATGGACTGGGGAATGAAAGACTATAAAGCAAACGGATTTCCAGATAAGGTAACAGATATGGATGGAAATGT  
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 AACCCGAAGTAAACATTGATCCTAAGGGAAATACTAGTATCGAATATGCTGATGGAAAAATCTGTAGCTTTAACAT  
 35 CAATGATAAAAGAAATAATGGATTGATGGTGAGATTCAAGAACAACATATTTATATAAATGGAAAAGAAATATAC  
 ATCATTTAATGATATTAACAAATAATAGACAAGACACTAAACATTAAGATTGTTGTAAAGATTGTTGCAAGAAAT  
 ACAACCGTAAAGAATTCATTTTAAATAAGATACGGGAGAGGTAAGTGAATTAACCTCATGGTTAAGTGTG  
 ACCATTCAAAATGGAAGAAAGAAATGAGTTCAACGATAGTGTGGAAGAAGATTTTATTTTACCTGTTTATAAGGGTG  
 AATTAGAAAAAGGATACCAATTTGATGGTTGGGAAATTTCTGGTTTCGAAGGTAAAAAAGACGCTGGCTATGTTAT  
 40 TAATCTATCAAAAGATACCTTTATAAAACCTGTAATCAAGAAAAAGAGGAGAAAAAGGAGGAAGAAAAATAACC  
 TACTTTGATGTATCGAAAAAGAAAGATAACCCACAAGATAAGCAATTAATTAAGTCAAGTCAAGAAAAAGA  
 GGATTTACAAAGAGAAGAGCATTCACAAAAATCTGATTCAACTAAGGATGTTACAGCTACAGTTCTTGATAAAAAAC  
 AATATCAGTAGTAAATCAACTACTAACAATCCTAATAAGTTGCCAAAAACTGGAACAGCAAGCGGAGCCAGACA  
 45 CTATTAGCTGCCGAATAATGTTTATAGTAGGAATTTTCTTGGATTGAAGAAAAAAATCAAGATTAA

(SEQ ID NO: 28)  
 YPVVLADTSSSEDALNISDKEKVAENKEKHENIHSAMETSQDFKEKKTAVIKEKEVVSKNPVIDNNTSNEEAKIKEENS  
 KSQGDYTDSEFNKNTENPKKEDKVYVIAEFKDKESGEKAIKELSSLKNTKVLYTYDRIFNGSAIETTPDNLKIKQIEG  
 50 SVERAQKVQPMNHNARKEIGVEEIDYLSINAPFGKNFDGRGMVISNIDTGTDRHKAMRIDDDAKASMRFKKEDLK  
 GTDKNYWLSDKIPHAFNYNGGKITVEKYDDGRDYFDPHGMHIAGILAGNDTEQDIKNFNGIDGIAPNAQIFSYKMYSD  
 AGSGFAGDETMFHAIEDSIKHNVDSVSVSSGFTGTGLVGEKYWQAIRALRKAGIPMVVATGNYATSASSSSWDLVANN  
 HLKMTDTGNVTRTAHEDAIAVASAKNQTFEFDKVNIGGESFKYRNIGAFFDKSKITTNEDGTAKPSKLKFVYIGKQD  
 QDLIGLDLRGKIAVMDRIYTKDLKNAFKKAMDKGARAIMVNTVNYNRDNWTELPAMGYEADGTSQVFSISGDD  
 55 GVKLWNMINPDKKTEVKRNNKEDFKDKLEQYYPIDMESFNSNKNPNVGDEKEIDFKFAPDTDKELYKEDIIVPAGSTSWG  
 PRIDLLLKPDVSAFGKNIKSTLNVINGKSTYGYMSGTSMATPIVAASTVLIRPKLKEMLERPVLKNLKGDDDKIDLTLTKI  
 ALQNTARPMMDATSWKEKSQYFASPRQGGAGLINVANALRNEVVATFKNTDSKGLVNSYGSISLKEIKGDKKYFTIKL  
 HNTSNRPLTFKVSASAITTDSLTDRLKLDETYKDEKSPDGKQIVPEIHPEKVKGANITFEHDTFTIGANSSFDLNAVINVGE  
 AKNKNKFVESFIHFESVEAMEALNSSGKKINFQPSLSMPLMGFAGNWNHEPILDKWAWEEGSRSKTLGGYDDDGKPKIP  
 60 GTLNLKIGGEGHIDKFNPAQVQNRKDKNTTSLDQNPFLFAFNNEGINAPSSSGSKIANIYPLDSNGNPQDAQLERGLTPS  
 PLVLRSAEEGLISIVNTNKEGENQRDLKVISREHFIRGILNSKSNDAKGKSSKLKVGWDLKWDGLIYNPRGREENAPESK  
 DNQDPATKIRGQFEPIAEGQYFYKFKYRLTKDYPWQVSYIPVKIDNTAPKIVSVDFSNPEKIKLITKDTYHKVKDQYKNE  
 TLFARDQKEHPEKFEIANEVWYAGAALVNEDGEVEKNLEVTYAGEGQGRNRKLDKDGNTIYEIKGAGDLRFGKIEVIA  
 LDGSSNFTKIHRIFANQADEKGMISYYLVDPDQDSSKYQKLGEIAESKFKNLNGKEGSLKDDTTGVEHHHQENEESIK  
 65 EKSSFTIDRNISTIRDFENKDLKLIKKKFREVDFTSETGKRMEEDYKYDDKGNIIAYDDGTDLEYETEKLDEIKSKIY  
 GVLSPSKDGHFEILGKISNVSKNAKVYGYNNYKSIEIKATKYDFHSKTMTFDLYANINDIVDGLAFAGDMRLFVKDNDQ  
 KKAIEKIRMPEKIKETKSEYPYVSSYGNVIELGEGDLSKNKPDNLTKMESGKIYSDSEKQYLLKDNILRKGYALKVTT

YNPGKTDMLENGVYSKEDIAKIQKANPNLRLSETTIYADSRNVEDGRSTQSVLMSALDGFNIIRYQVFTFKMNDKGE  
AIDKDGNLVTDSSKLVLFKDDKEYTGEDKFNVEAIKEDGSMFLFIDTKPVNLSMDKNYFNPSKSNKIYVRNPEFYLRGKI  
SDKGGFNWELRVNESVVDNYLIYGDLDHIDNTRDFNIKLVKDGIMDWGMKDYKANGFPDKVTDMDGNVYLQGTYS  
5 DLNAKAVGVHYQFLYDNVKEPVNIDPKGNTSIEYADGKSVVFNINDKRNNGFDGEIQEHYINGKEYTSFNDIKQIIDK  
TLNIKIVVKDFARNTTVKEFILNKDTGEVSELKPHRVTVTIQNGKEMSSTIVSEEDFILPVYKGELEKGYQFDGWEISGFE  
GKKDAGYVINLSKDTFIKPVFKKIEEKKEEENKPTFDVSKKKDNPNQVNHSQLNESHKEDLQREEHSQKSDSTKDVAT  
VLDKNNISSKSTNNPNKLPKTGTASGAQTLAAGIMFIVGIFLGLKKKNQD

#### **ID6 597 bp**

(SEQ ID NO: 29)

CTTGAATTAATAAAAAACGTCATGCGACTAAGCATTTTACTGATAAGCTTGTGATCCCAAAGATGTGCGTACGG  
CTATCGAAATTGCAACCTTAGCGCCAAAGCGCCACAACAGCCAGCCTTGGAATTTGTGGTGGTACGTGAGAAAAA  
15 TGCTGAACCTGGCAAAGTTAGCTTATGGTTCCAATTTTGAACAGGTATCATACGCCCTGTAACCATTCCTTGT  
CAGATACGGACTTAGCCAAACGTGCTCGTAAGATTGCCCGTGTGGTGGTCTAATACTTTCTGAAGAGCAACT  
TCAATATTTTATGAAAAATCTGCCAGCTGAGTTTCCCCGTTACAGTGAGCAACAAGTCAGCGACTACCTAGCTCTC  
AATGCAGGTTTGGTTGCCATGAACCTGGTTCTTGCAATTGACAGACCAAGGAATTGGTTCTAACATTATCTTGGTTT  
TGACAAATCAAAAGTTAATGAAGTTTGGAAATCGAAGACCGTTTCCGCCAGAACTCTTGATCAGAGTGGGTAT  
20 ACAGACGAAAAATTGGAACCAAGCTACCGCTTGCCAGTAGATGAAATCATCGAGAAAAGATAG

(SEQ ID NO: 30)

LELNKKRHATKHFTDKLVDPKDVRTAIEIATLAPSAHNSQPWKFFVVREKNAELAKLAYGSNFEQVSSAPVTIALFTDT  
DLAKRARKIARVGGANNFSEEQLQYFMKNLPAEFARYSEQQVSDYLALNAGLVAMNLVLALTDQIGISNIILGFDKSK  
25 VNEVLEIEDRFRPELLITVGYTDEKLEPSYRLPVDEIIEKR

#### **ID7 1401 bp**

(SEQ ID NO: 31)

ATGACAGCAATTGATTTTACAGCAGAAGTAGAAAAACGCAAAGAAGACCTCTTGGCTGACTTGTAGCCTTTTGG  
30 AAATCAATTCAGAACGTGATGACAGCAAGGCTGATGCCAGCATCCATTTGGGCTGGTCCAGTAAAAGCCTTGGA  
GAAATTCCTTGAATTCGACAGACCGGATGGCTACCCAATAAGAAATGTTGATAACTATGCAGGACATTTTGAAGTTT  
GGTGATGGAGAAGAAGTTCTCGGAATCTTTGCCCATATGGATGTGGTGCCTGCTGGTAGCGGTTGGGACACAGACC  
CTTACACACCAACTATCAAAGATGGTGCCTTTATGCGCGCGGGGCTTCGGACGATAAGGGTCTACAACAGCTTG  
TTACTATGGTTTGAATAATCATCAAAGAATTGGGTCTTCCAACCTTAAGAAAGTTTCGCTTCACTCGTTGGAACAGACG  
35 AAGAATCAGGCTGGGACAGATGGACTACTACTTTGAGCACGTAGGACTTGCCAAACCAGATTTCGGTTTCTCACC  
AGATGCTGAATTTCCAATCATCAATGGTGAAAAAGGAAATATCACGGAATACCTCCACTTTGCAGGAGAAAAATAC  
AGGTGTTGCCCGTCTTACAGCTTTACAGGTGGTTACGTGAAATATGGTACCAGAATCAGCAACAGCAGTCTTCTAT  
TCAGGTGACTTGGCTGACTTGCAAGCTAAACTAGATGCCTTTGTTGCAGAACACAACTTAGAGGAGAACTCCAAG  
40 AAGAAGCTGGCAAATACAAGGTGACGATCATTTGTTAAATCAGCCCACGGTGTATGCCTGCTTCAGGTGTCAATGG  
CGCAACTTACCTTGCCCTCTTCTCAGCCAGTTTGGCTTTGCTGGTCCAGCCAAAGACTACCTTGACATCGCAGGTA  
AAATTCCTTTGAACGATCATGAGGTGAAAAATCTTAAGATTGCTCATGTGGATGAAAAGATGGGTGCTCTTTCTAT  
GAATGCCGGCGTCTTCCACTTCGATGAAACAAGTGCTGATAATACCATTGCCCTCAACATCCGCTATCCAAAAGGA  
ACAAGTCCAGAACAAATCAAGTCAATCCTTGAAAACTTGCCAGTTGTTTCTGTTAGCCTGTCTGAACACGGTCACA  
45 CGCTCACTATGTGCAATGGAAGATCCACTTGTCGAAACCTTGTTGAATATCTATGAAAAACAACTGGCTTTAA  
AGGTGATGAACAAGTCATCGGTGGTGGAACTTTGGTTCGCTTGCTAGAACGCGGAGTTGCCCTACGGTCTATGTTT  
CCAGACTCGATTGATACCATGCACCAAGCCAATGAATTTATCGCCTTGATGATCTTTTCCGAGCAGCAGCAATTTA  
TGCCGAAGCTATTTACGAATTGATCAAAATA

(SEQ ID NO: 32)

MTAIDFTAEEVEKRKEDLLADLFSLEINSERDDSKADAQHPFGPGPVKALEKFLEIADRDGYPTKNVDNYAGHFEGDG  
50 EEVLGIFAHMDVVPAGSGWTDPTPTIKDGRLYARGASDDKGPPTACYYGLKIIKELGLPTSKKVRFIGVTDEESGWA  
DMDYYFEHVGLAKPDFGFSPDAEFPIINGEKGNIETYLHFAGENTGVARLHSFTGGLRENMPESATAVVSGLDLADLQA  
KLDAFVAEHKLRGELQEEAGKYKVTHIGKSAHGAMPASGVNGATYALFLSQFGFAGPAKDYLADIAGKILLNDHEGENL  
KIAHVDEKMGALSMNAGVFHFDETSADNTIALNIRYPKGTSPQIKSILENLPVSVSLSEHGHTPHYVPMEDPLVQTL  
55 NIYEKQTGFKGHEQVIGGGTFGRLLERGVAYGAMFPDSIDTMHQANEFIALDDLFRAAAIIYAEIYELIK

#### **ID8 1617 bp**

(SEQ ID NO: 33)

GTGTATACTATTATAAAATCAAATATAAAAAATTTAGTTTATTAACGATATTTATTGTTGCTGGTCAATTATTGCT  
60 AATTTATGCAGCAACTATTAATGCTCTGGTGTGAATGAATTAATTGCGATGAATTTAGAGCGGTTTTTGAAATTGT  
CAATCTACCAAATGATTGTCTGGTGTGGGATAATATTCCTGACTGGGTAGTGAAAAATTATCAGGTTGAAGTGAT  
CCAAGAGTTTAACTAGAGATTCGAAATAGAGTTGCCACAGACATCTCTAACTCTACCTATCAAGAATTTATAGT  
AAATCATCAGGAACATATCTTTCTGGCTAAATAATGATGTTTCAGACTTTAAATGATCAGGCGTTTAAACAACCTTT  
65 TTTAGTAATAAAAGGAATTTCTGGTACTATATTTGCAGTTGTGACTCTTAATCACTATCATTGGTCATTGACTGTAG  
CCACCTTGTTTTCAATTAATGATTATGCTACTTGTAACAAAAATCTTTGCATCGAAAAATGCCGAGAAGTTAGTCTAAAT

TTAACTAACCAAAATGAAGCTTTTTTAAAAATCTAGTGAGACTATATTGAATGGATTGATGTGTTAGCGTCCTTGAA  
 TCTTTTATATGTATTGCCTAAGAAAATTAAGAAGCAGGAATTTTATTAAAGATGGTTATACAAAGAAAGACAAC  
 GTAGAAACGTTAGCAGGCGCTATTAGCTTCTTTCTCAATATTTTTTTTTCAGATATCTCTCGTTTTTTAACAGGCTAT  
 CTTGCAATAAAAGGAATAGTGAAAAATGGTACTATTGAAGCAATAGGAGCACTAACAGGTGTTATTTTTACAGCGC  
 5 TAGGTGAATTAGGAGGTCAATTATCCTCTATTATTGGTACGAAGCCTATTTTTTTAAAAATTGTATTCAATTAATCCA  
 ATTGAGTCAAAATAAAATGAATGATATCGAACCAATGAGGTGAATAGAGATTTTCCGTTATATGAAGCAAAAAAT  
 ATTTGCTATAAGTATGGAGATAAAGAAAATATTAACCACTTAAATTTTTGTTTCAACGTAATGAAAAGTATTTAAT  
 TTTAGGTGAAAGTGAAGCGGGAATCTACATTATTAATAATTTGAATGGCTTTTTGAGAGATTATAGTGGAGAA  
 10 TTGCGATTCTGCGGGGATGATATAAAAAAAACCTCCTATTATAAATATGGTTTCGAATGTTCTATATGTAGATCAAAA  
 AGCTTATTTGTTTGAAGGTACGATTAGAGATAATTTTTATTGGAAGAAAATTATACTGATGAAGAAATACTACAG  
 TCTTTAGAGCAAGTTGGTTTGAAGTGTAAAAAGATTTTCTAATAACATTTTAGATTATTTATGTTGGTGATGATGGGAG  
 ATTACTGTCAGGAGGGCAGAAACAAAAAATTACTTTAGCTAGAGGGCTAATTAGAAATAAGAAAATAGTATTAAT  
 TGACGAGGGAACCTCTGCTATCGATAGGAGAACTTCGTTAGCGATTGAACGTAAGATATTAGATAGAGAGGATTG  
 15 ACTGTCAATTATTGTTACCCATGCTCCGCATCCGGAACCTAAACAATATTTTACTAAGATATATCAATTTCCAAAGGA  
 TTTTATTTAA

(SEQ ID NO: 34)

MYTIKSNKKFSLTIFIVAGQLLLIYAATINALVLNELIAMNLERFLKLSIYQMIVWCGIIFLDWVVKNYQVEVIQEFNLE  
 20 IRNRVATDISNSTYQEFHKSSTYLSWLNNDVQTLNDQAFKQLFLVIKGISGTIFA VVTLNHYHWSLTVA TLFSLMIML  
 LVPKIFASKMREVS LNLTNQNEAFLKSSETILNGFDVLASLNLLYVLPKKIKEAGILLKMVIQRKTTVETLAGAISFFLNIF  
 FQISLVFLTG YLAIKGIVKIGTIEAIGALTGVIFTALGELGGQLSSIIGTKPIFLKLYSINPIESNKMNDIEPNEVNRDFLYEA  
 KNICYKYGDKEILKNLNFQFRNEKYLILGESGSGKSTLLKLLNGFLRDYSGELRFCGDDIKKTSYLNMVSNVLYVDQK  
 AYLFEGTIRDNI LLEENYTD EILQSLEQVGLSVKDFPNNILDYVGGDGRLLSGGQKQKITLARGLIRNKKIVLIDEG TSA  
 25 IDRR TSLAIERKILDREDLT VIIVTHAPHELPKQYFTKIYQFPKDFI

**ID9 705 bp**

(SEQ ID NO: 35)

ATAACAGTTAAACAGATTATGGACGAAATAGCCGTTTCAGATATGACTGCAAGGCGCTATTTACAGGAATTAGCTG  
 30 ATAAAGATTTCGTGATTCTGTGTCATGGTGGAGCTGAAAAACTTCGAACCAACTCCCTTTTGACTAATGAGCGATC  
 AAATATTGAAAAACAAGCCCTCCAACCGGCAGAAAAACAAGAAATAGCCCATTTTGACGGCAGTCTAGTAGAAGA  
 AAGAGAAACTATTTTCATTGGACCAGGAACAACATTAGAGTTTTTTCGCGGTGAGTTGCCTATTGACAATATCCGC  
 GTCGTAACCAACAGTCTACCTGTTTTCTGATTTTAAGCGAACGAAAAATTAAACAGATTGATTTTAAATAGGTGGAAA  
 35 TTATCGCGATATTACAGGTGCTTTTGTGGTACATTGACCCTACAAAATCTCTCTAACTCCAATTTTCTAAAGCTTT  
 CGTTAGCTGTAATGGTATTCAAAACGGAGCTCTAGCTACTTTTAGCGAGGAAGAGGGAGAGGCTCAACGCATCGCT  
 TTAATAATTCTAATAAAAAATATTTACTCGCAGATCATAGCAAGTTCAATAAGTTTGATTTTATACTTTTATAA  
 TGTATCAAATCTTGATACTATTGTTTCAGATTCTAACTAAGTGATTCAATCCTTTTAAAGCTATCTAAACACATTAA  
 AGTCATCAAGCCTTAA

(SEQ ID NO: 36)

ITVKQIMDEIAVSDMTARRY LQELADKDLLIR VHGAELKRTNSLLT NERSNIEKQALQTA EKQEI AHFAGSLVEERETIF  
 40 IGP GTTLEFFARELPIDNIR VVTNSLPVFLILSERKLTDLILIGGN YRDITGAFVGT LTLQNLN LQFSKAFVSCNGIQNGAL  
 ATFSEEEGEAQRIALNNSNKKYLLADHSKFNKFDYTFY NVSNLDTIVSDSKLSDSILFKLSKHIVIKP

**ID10 483 bp**

(SEQ ID NO: 37)

ATGACTGAGTTTTCGTTAGATCTTCTTCTAGAAGCCATTAAACTAGCTCGTTGGACCTACTACTATCACTTGAAACA  
 50 GCTAGACAAAAACAGATAAAGACCAAGAGCTTAAACTGAAATTCAATCCATCTTTATCGAACACAAGGGAAATTA  
 TGCTTATCGCCGGGTTCAATTAGAACTAAGAAATCGTGGTTATCTGGTAAATCATAAAAGAGTTCAAGGCTTGaTGA  
 AAGTACTCAATTTACAAGCTAAAATGCGAAAGAAACGAAAAATATCTTCTCATAAAGGAGACGTTGGTAAGAAGG  
 CAGAGAATCTCATTCAAGCCCAATTTGAAGGCTCTAAACAATGGAAAAAGTGCTACACAGATGTGACTGAATTTGC  
 CATTCCAGCAAGTACTCAAAAGCTTTACTTATCACCAGTTTATAGATGGCTTAAACAGCGAAATTATTGCTTTTAATC  
 55 TTTCTTGTTCGCTAATTTAGAATAA

(SEQ ID NO: 38)

MTEFSLDLLLEAIKLARWY YYYHLKQLDKTDKQELKTEIQSIFIEHKGN YAYRRVHLELRNRGYLVNHKRVQGLMKV  
 60 LNLQAKMRKKRKYSSHKG DVGKKAENLIQAQFEGSKTMEKCYTDVTEFAIPASTQKLYLSPVLDGFNSEIIAFNLSCSPN  
 LE

**ID14 1266 bp**

(SEQ ID NO: 39)

CCAGGATTTGGTACCGTTGCAAGTGGTGTGCCTTTCCTCCTAAAGGAAAAATGGAGGAAAAATCAATCAATCAGCAC  
 65 ATTCAGATATCAAAAGTTGCTAAGGTATTGGTCAAGGATGAAGATGAAAAAATCGCTTGCTGTCAGCAGGGAATG  
 ACTTTAACTTTGTAACCAATGTGGATGATATTTATCAGACCAGGATATTACTATCGTAGTGAATTTGATGGGGCGT

ATTGAGCCTGCTAAACCTTTATCACTCGTGCCTTGAAGCTGGAACACGTTGTTACTGCTAACAAGGACCTTTT  
 AGCTGTCCATGGCGCAGAATTGCTAGAAATCGCTCAAGCTAACAAGGTAGCACTTTACTACGAAGCAGCAGTTGCT  
 GGTGGGATTCCAATTCTTCGTACTTTAGCAAATTCCTTGGCTTCTGATAAAATTACGCGCGTCTTGGAGTAGTCAA  
 CGGAACCTTCCAACCTTCATGGTGACCAAGATGGTGAAGAAGGCTGGTCTTACGATGATGCTCTTGGGAAGCACAA  
 CGTCTAGGATTTGCAGAAAGCGATCCGACGAATGACGTAGATGGGATTGATGCAGCCTACAAGATGGTTATTTTGA  
 GCCAATTTGCCCTTTGGCATGAAGATTGCCCTTTGATGATGTAGCCACAAGGGAATCCGCAATATCACACCAGAAGA  
 CGTAGCTGTAGCTCAAGAGCTTGGTTACGTAGTGAAATTTGGTTGGTTCTATTGAGGAAACTTCTTCAGGTATTGCTG  
 CAGAAGTGACTCCAACCTTCTACCTAAAGCGCACCCACTTGGTGTAGTGTGAATGGCGTAATGAACGCTGTCTTTGT  
 AGAATCTATCGGTATTGGTGAGTCTATGTACTACGGACCGGTCGCGGTCAAAAACCAACTGCAACAAGTGTGTA  
 GCTGATATTGTCCGTATCGTTCGTCTTGAATGATGGTACTATTGGCAAAGACTTCAACGAATATAGCCGTGACTT  
 GGTCTTGGCAAATCCTGAAGATGTCAAAGCAAACCTACTATTCTCAATCTTGGCTCTAGACTCAAAAGGTCAGGTC  
 TTGAAGTTGGCTGAAATCTTCAATGCTCAAGATATTTCTTTAAGCAAATCCTTCAAGATGGCAAAGAGGGTGACA  
 AGGCGCGTGTCTGTTATCATCACACACAAGATTAATAAAGCCAGCTTGAAATGTCTCAGCTGAATTGAAGAAGGT  
 TTCAGAATTCGACCTCTTGAATACCTTCAAGGTGCTAGGAGAATAA

(SEQ ID NO: 40)

PGFGTVASGVPFLLKENGKINQSAHSDIKVAKVLVKDEDEKNRLLAAGNDFNFVTVNDDILSDQDITIVVELMGRIEPA  
 KTFITRALEAGKHVVTANKDLLAVHGAELLEIAQANKVALYEEAAVAGGIPILRTLANSLSADKITRVLGVVNGTSNFM  
 VTKMVEEGWSYDDALAEQRLGFAESDPTNDVIDAAYKMLVLSQFAFGMKIAFDDVAHKGIRNITPEDVAVAQELG  
 YVVKLVGSIEETSSCIAAEVPTFLPKAHPLASVNGVMNAVVFESIGIGESMYGPGAGQKPTATSVVADIVRIVRRLND  
 GTIGKDFNEYSRDLVLNRPEDVKANYFYSILALDSKGQVLKLAEIFNAQDISFKQILQDGKEGDKARVVIITHKINKAQLE  
 NVSAELKKVSEFDLLNTFKVLGE

#### **ID16 1725 bp**

(SEQ ID NO: 41)

ATGAAACACCTATTATCTTACTTCAAACCTACATCAAGGAATCAATTTTAGCCCCCTTGTTCAGCTGTTAGAAGC  
 TGTTTTTGAAGCTCTTGGTTCCCATGGTGATTGCTGGGATTGTTGACCAATCTTTACCTCAGGGAGATCAAGGTCATC  
 TCTGGATGCAGATTGGCCTGCTCCTTATCTTTGCAGTAATGGCGTTTATAGTGGCCTTGATAGCTCAATTTACTCAG  
 CAAAGGCAGCAGTAGGTTCTGCTAAGGAATTGACAAACGATCTTTATCGTCATATTCTTTCCTTGGCCCAAGGACAG  
 CAGAGACCGTCTGACAACTTCTAGTTTGGTCACTCGCTTGACTTCGGATACCTACCAGATTGAGCTGGTATCAATC  
 AATTCCTGCGTCTCTTTTTACGAGCGCCCATATCGTTTTTGGTGCCATTTTATGGCTTATCGAATCTCAGCTGAGT  
 TGACTTTCTGGTTCTTAGTCTTGGTTGCCATTTTGACCATTTGTCATTGTAGGGTTATCTCGATTGGTCAATCCTTTCT  
 ACAGTAGTCTCAGAAAGAAAACGGACCAACTGGTTTCAGGAAACGCGCCAGCAATTGCAAGGGATGCGGGTTATTCT  
 GTGCTTTTGGTCAAGAAAAACGAGAGTTACAGATTTTTCAAACCTTAACCAAGTTTATGCTAGATTACAAGAAAA  
 GACAGGTTTCTGGTCTAGTTTATTAACACCTCTGACCTATCTGATTGTCAATGGAACCTTCTCGTTATTATCTGGCA  
 AGGCTATATTTCAATTCAAGGAGGAGTGCTCAGTCAAGGTGCTCTCATTTGCTCTTATCAATTACCTCTTACAGATT  
 TGGTGAATTTGGTCAAGCTAGCCATGTTGATCAATTCCTCAACCAGTCTATATCTCAGTCAAGCGAATCGAGGA  
 AGTCTTTGTTGAGGCTCCAGAGGATATCCATTACAGAGTTAGAACAAAAGCAAGCTACCAGAGATAAGGTTTACAA  
 GTCCAAGAATTGACCTTTACCTATCCTGATGCGGGCCAGCCTTCTCTGAGATACATTTCTTTGATATGACTCAAGG  
 ACAAATTTAGGTATCATCGGGGGAACCTGGTTCTGGTAAATCAAGCTTGGTGAACCTTACTTGGACTTTATCCAG  
 TAGACAAGGGGAACATTGACCTTTATCAAAATGGACGTAGTCTCTTAATTTGGAGCAGTGCGCGTCTTGGATTGC  
 CTATGTACCTCAAAAGGTGCAACTCTTTAAAGGAACCAATTCGTTTCAACTTGACTCTAGGTTTCAATCAAGAAGTAT  
 CTGACCAGGAACCTGCGCAGGCTTGGAGATTGCGCAAGTCAAGGATTTGTCAGTGAAGGAAGGACTCTTGG  
 ATGCTCTAGTTGAGGCAGGGGGGCGAAATTTCTCAGGTGGACAAAAACAAAGATTGTCTATCGCCCGAGCAGCTT  
 GCGCCAGGCTCCGTTTCTCATCCTAGATGATGCAACCTCGGCACTGGATACCATTACAGAGTCCAAGCTCTTGAAA  
 GCTATTAGAGAAAAATTTCCAAACACGAGCTTAATTTTGATCTCTCAACGAACCTCAACTTTACAGATGGCGGACC  
 AGATTCTCCTCTTGAAAAAGGTGAGTTGCTAGCTGTTGGCAAGCAGGATGACTTGATGAAATCCAGCCAAGTCTA  
 TTGTGAAATCAATGCATCCCAACATGGAAAGGAGGACTAG

(SEQ ID NO: 42)

MKHLLSYFKPYIKESILAPLFKLLAEVFEVVPMVIAGIVDQSLPQGDQGHLMQIGLLLIFAVIGVLVALIAQFYSAKAA  
 VGSAKELTNDLYRHILSLPKDSRDLTTSSLVTRLTSDTYQIQGTGINQFLRLFLRAPIIVFGAIFMAYRISAEFTWFLVLVA  
 ILTIVIVGLSRLVNPFFYSSLRKKTQDLVQETRQQLQGMVRVIRAFGQEKRELQIFQTLNQVYARLQKGTGFWSLLTPLYL  
 IVNGTLLVIIWQGYISIQGGVLSQGALIALINYLQILVELVKLAMLINSLNQSYISVKRIEEVFVEAPEDIHSELEQKQATR  
 DKVLQVQELTFTYPDAAQPSLRYISFDMTQGGILHGGTGSGKSSLVQLLLGLYPVDKGNIDLYQNGRSPLNLEQWRSW  
 IAYVPQKVELFKGTIRSNLTLGFGNQEVSQELWQALEIAQAKDFVSEKEGLLDALVEAGGRNFGSGGQKQRLSIARAVLR  
 QAPFLILDDATSALDTITESKLLKAIRENFPNTSLILISQRTSTLQMAQDQILLLEKGELLAVGKHDDLKSSQVYCEINASQ  
 HGKED

#### **ID18 1224 bp**

(SEQ ID NO: 43)

ATGAAACGTTTCTCTCGACTCAAGAGTCGATTACAGTTTGTCTTGGCAGTATTTTTTCTACTGGTCATCGGTGTGGT  
 GGCTATCTATATAGCCGTTAGTCATGATTATCCCAATAATATTCTGCCCCATTTAGGGCAGCAGGTGCGCTGGATTG  
 CCTTGGGGCTTGTGATTGGTTTTGTGGTCATGCTCTTAATACAGAAATTTCTTTGGAAGGTGACCCCTTTCTATATA

TTTTAGGCTTGGGACTTATGATCTTGCCGATTGTATTTTATAATCCAAGCTTAGTTGCATCAACGGGTGCCAAAAAC  
 TGGGTATCAATAAATGGAATTACCTATTCCAACCGTCAGAAATTTATGAAGATATCCTATATCCTCATGTTGGCTCG  
 TGTCATTGTCCAATTTACAAAAGAAACATAAGGAATGGAGACGCACGGTTCCGCTGGACTTTTGTAAATTTCTGGA  
 5 TGATTCTCTTTACCATTTCCAGTCTAGTTCTTTTAGCACTTCAAAGTGACTTGGGGACGGCTTTGGTTTTGTAGCCA  
 TTTTCTCAGGAATCGTTTTATTATCAGGGGTTCTTGGAAAAATTATATCCAGTATTTGTGACTGCTGTAACAGGA  
 GTTGCTGGTTTTCTTAGCTATCTTTATTAGCAAGGACGGACGAGCTTTTCTTACCAGATTGGAATGCCGACCTACCA  
 AATTAATCGGATTTTGGCTTGGCTCAATCCCTTTGAGTTTGGCCAAACAACGACTTACCAGCAGGCTCAAGGGCAG  
 ATTGCCATTGGGAGTGGTGGCTTATTTGGTCAGGGATTAAATGCTTCGAATCTGCTTATCCAGTTCGAGAGTCAGA  
 10 TATGATTTTTACGGTTATTGCAGAAGATTTTGGCTTTATTTGGCTCTGCTCTGGTTATTGCCCTCTATCTCATGTTGAT  
 TTACCGTATGTTGAAGATTACTCTTAAATCAAATAACCAGTTCTACACTTATATTTCCACAGGTTTGATTATGATGTT  
 GCTCTTCCACATCTTTGAGAATATCGGTGCTGTGACTGGACTACTTCTTTGACGGGGATTCCCTTGCCTTTCATTTC  
 GCAAGGGGGATCAGCTATTATCAGTAATCTGATTGGTGTGGTTTGGCTTTATCGATGAGTTACCAGACTAATCTAG  
 CTGAAGAAAAGAGCGGAAAAGTCCCATTTCAAACGGAAAAGGTTGTATTAACAAATTAATAA

15 (SEQ ID NO: 44)  
 MKRSLDSRVDYSLLLPVFLLVIGVVAIYIAVSHDYPNNILPILGQQVAWIALGLVIGFVVMFNTEFLWKVTPFLYILGL  
 GLMILPIVFYNPSLVASTGAKNWVSINGITLFPSEFMKISYILMLARVIVQFTKKHKEWRRTPVPLDFLLIFWMILFTIPVL  
 VLLALQSDLGTALVFVAIFSGIVLLSGVSWKIIIPVFVTAFTGVAGFLAIFISKDGRAFLHQIGMPTYQINRILAWLNPFEEA  
 20 QTTTTYQQAQGGQIAIGSGGLFGQGFNASNLLIPVRESDMIFTVIAEDFGFISVVLVIALYLMLIYRMLKITLKSNNQFYTYIS  
 TGLIMMLLFHIFENIGAVTGLLPLTGIPLPIFSQGSIAISNLIGVGLLLSMSYQTNLAEEKSGKVPFKRKKVVLKQIK

#### ID22 987 bp

25 (SEQ ID NO: 45)  
 ATGGTGGCTAAGAAAAAATCTTATTTTTTATGTGGTCTTTTTCTTGGAGGTGGTGCAGAGAAGATTCTATCAAC  
 CATTGTTTCAAATCTGGATCCAGAAAAAGTATGATATTGATATTCTTGAAATGGAGCACTTTGACAAGGGATATGAA  
 TCTGTTCCAAAGCATGTACGCATTTTAAAAATCCCTTCAAGATTATCGCCAAACCAGATGGTTACGAGCTTTTTTGTG  
 GAGAATGAGAATTTATTTTCCAAGACTGACTCGTCGTTTCTTGTAAAAGATGATTATGATGTTGAAGTTTCTTTTA  
 30 CCATTATGAATCCACCACTGTTGTTCTCTAAAAGAAGAGAAGTCAAGAAGATATCTTGGATTTCATGGAAGTATTGA  
 AGAAGTTCTTAAAGGATAGCTCTAAAAGAGAATCACATAGAAGCCAGTTGGATGCTGCGAATACAATTGTAGGGATT  
 TCAAAAAAGACCAGCAATTCTATCAAGGAAGTTTATCCAGATTATACTTCTAAATTACAGACAATCTACAATGGAT  
 ATGATTTTCAGACTATTCTAGAAAAATCTCAAGAGAAGATCGATATCGAGATTGCTCCTCAAAGTATCTGTACTATC  
 GGACGGATTGAGGAAAAATAAGGGTTCTGACCGTGTAGTGAAGTGATACGATTATTACACCAAGAGGGAAAAAAC  
 35 TATCATCTCTATTTTATCGGGGCTGGTGATATGGAAGAGGAACTGAAAAAACGAGTCAAAGAGTATGGGATTGAG  
 GACTATGTACATTTCTTGGTTATCAAAAAAATCCTTATCAGTATCTATCTCAGACGAAAGTCTTTTGTCTATGTCT  
 AAACAAGAAGGTTTTCTTGGAGTGTATGTGGAGGCCTTGAGTCTGGGACTCCCTTTATCTCTACGGACGTTGGAG  
 GGGCTGAGGAATTATCCCAAGAAGGACGATTTGGACAAATCATTGAGAGCAATCAAGAGGCAGCTCAGGCGATTA  
 CTAATTACATGACTTCTGCCTCAAACTTTGATGTGCGATGAGGCTAGCCAATTCATTCAACAATTACAATTACAAAA  
 40 CAAATCGAACAAGTAGAAAAACTATTAGAGGAGTAG

(SEQ ID NO: 46)  
 MVAKKKILFFMWSFSLGGGAEKILSTIVSNLDPEKYDIDILEMEHFDKGYESVPKHVRILKSLQDYRQTRWLRAFLWRM  
 RIYFPRLTRRLLVKDDYDVEVSFTIMNPPLFSKRREVKKISWIHGSIEELLKDSSKRESHRSQLDAANTIVGSKKTSNSIK  
 45 EVYPDYTSKLQTIYNGYDFQILEKSQEKIDIEIAPQSICTIGRIENKGS DRVVEVIRLLHQEGKNYHLYFIGAGDMEEEL  
 KKR VKEYGIEDYVHFLGYQKNPYQYLSQTKVLLSMSKQEGFPGVYVEALSLGLPFISTDVGGAEELSQEGRFGQIESNQ  
 EAAQAITNYMTSASNFDVDEASQFIQQFTITKQIEQVEKLLLE

#### ID23 1434 bp

50 (SEQ ID NO: 47)  
 ATGGAACTGCATTAATTAGTGTGATTGTGCCAGTCTATAATGTGGCGCAGTACCTAGAAAAATCGATAGCTTCCA  
 TTCAGAAGCAGACCTATCAAAATCTGGAAATTATTCTTGTGATGATGGTGCAACAGATGAAAAGTGGTGGCTTGTG  
 TGATTCAATCGCTGAACAAGATGACAGGGGTGTCAGTGCTTCATAAAAAAGAACGAAGGATTGTCGCAAGCAGGAAA  
 TGATGGGATGAAGCAGGCTCACGGGGATTATCTGATTTTTATTGACTCAGATGATTATATCCATCCAGAAATGATTC  
 55 AGAGCTTATATGAGCAATTAGTTCAAGAAGATGCGGATGTTTCGAGCTGTGGTGTCATGAATGTCTATGCTAATGA  
 TGAAAGCCCACAGTCAGCCAATCAGGATGACTATTTTGTCTGTGATTCTCAAACATTTCTAAAGGAATACCTCATA  
 GGTGAAAAAATACCTGGGACGATTTGCAATAAGCTAATCAAGAGACAGATTGCAACTGCCCTATCCTTTCCTAAGG  
 GGTTGATTACGAAGATGCCTATTACCATTTTGATTAAATCAAGTTGGCCAAGAAGTATGTGGTTAATACTAAACCC  
 60 TATTATTACTATTTCCATAGAGGGGATAGTATTACGACCAAAACCTATGCAGAGAAGGATTTAGCCTATATTGATAT  
 CTACCAAAAAGTTTTATAATGAAGTTGTGAAAAACTATCCTGACTTGAAAGAGGTCGCTTTTTTCAGATTGGCCTATG  
 CCCACTTCTTTATTCTGGATAAGATGTTGCTAGATGATCAGTATAAACAGTTTGAAGCCTATTCTCAGATTTCATCGT  
 TTTTAAAAGGCATGCCTTTGCTATTTCTAGGAATCCAATTTCCGTAAGGGGAGAGAAGATTAGTCTTTGGCCCT  
 ATTCATAAATATTTCTTATATCGATTCTTATTACTGAAAAATATTGAAAAATCTAAAAAATTACATTAG

65 (SEQ ID NO: 48)

METALISVIVPVYNAQYLEKSIASIQKQTYQNLEIILVDDGATDESRLCDSIAEQDDRVSVLHKKNEGLSQARNDMGK  
 QAHGDYLFIDSDDYIHPMIQSLYEQLVQEDADVSSCGVMNVYANDESPQSANQDDYFVCDSTFLKEYLIGEKIPGTI  
 CNKLIKRIATALSFPKGLIYEDAYYHFDLIKLAKKYVNVNTPKYYYFHRGDSITTKPYAEKDLAYIDIYQKFYNEVVKN  
 YPDLKEVAFFRLAYAHFFILDKMLLDDQYKQFEAYSQIHRFLKGHAFISRNPFRKGRRIISALALFINISLYRFLLLKNIE  
 KSKKLH

#### **ID24 735bp**

(SEQ ID NO: 49)

ATGAGAATCAAAGAGAAAAACCAATAATATTAATGGAGGAATAAAAAATGTAAGTAAGCATTATGGTCATTCAATC  
 ATTCTCAAAGATATAAAATTTTGCACCTTAACAAGGGTGAAATTGTTGGTCTAGCAGGGAGAAATGGAGTTGGTAAGA  
 GTACGTTGATGAAAAATTTGTTTCAGAATAATCAACCGACTTCAGGTAATATTATAAGCAGTGATAATGTTGGGTA  
 TTTAATCGAAGAACCAAAATTTATTTTATCTAAAACAGGTTTAGAGAATTTAAAAATTTGTCAAATTTATATGGTG  
 TTGACTACAATCAAGAAAGATTTAGATGTTTGTATCCAAGAGTTAGATTTGACTCAGTCTATTAATAAAAAAGTAAA  
 GACCTATTCTTTGGGTACAAAACAAAAATTAGCTTTGCTTCTAACTCTCGTTACGGAACCTGATATATTGATTTTAG  
 ATGAACCGACTAATGGTTTAGATATTGAATCATCACAAATAGTTTTAGCGGTTCTAAAAAAATTAGCTTTACATGA  
 AAATGTGGGAATTTAATATCGAGTCATAAATTAGAAGACATTGAAGAAATTTGTGAGAGAGTTCTTTTCTTGGAG  
 AACGGGCTTTTGACATTTCAAAAAGTAGGAAAAGATAGTCATAATTTCTGTTTGAGATAGCTTTTTCATCAGCTAC  
 AGATAGAGACATTTTCATTACCAAACAAGAATTTTGGGATATTGTTTAG

(SEQ ID NO: 50)

MRIKEKTNNINGGIKNVSKHYGHSIILKDINFALNKGEIVGLAGRNGVGKSTLMKILVQNNQPTSGNISSDNVGYLIEEP  
 KLFLSKTGLENLYLSNLYGVVDYNQERFRCLIQELDTQSINKKVKTYSLGTKQKLALLLTLPTEPDILDEPTNGLDIES  
 SQIVLAVLKKLALHENVGILISSHKLEDEIEICERVLFLENGLLTFQKVGKDSHNFLEIAFSSATDRDIFITKQEFWDIV

#### **ID25 1704bp**

(SEQ ID NO: 51)

ATGACTGAATTAGATAAACGTCACCGCAGTAGCATTTATGACAGCATGGTTAAATCACCTAACCGTGCTATGCTTC  
 GTGCGACTGGTATGACAGATAAGGACTTTGAAACATCGATTGTGGGAGTGATTTGCGACTTGGGCGGAAAAATACACC  
 ATGTAACATTCACCTTGCATGATTTCCGGGAACTGGCTAAAGAAGGTGTCAAATCTGCAGCGCTTGGCCTGTACAG  
 TTTGGAACCATACCGTAGCGGACGGGATCGCTATGGGAACGCCTGGTATGCGTTTCTCTCTAACATCTCGTGACAT  
 CATCGCGGACTCCATCGAGGCGGCTATGAGTGGTCAACAACGTGGATGCCTTCGTGCGTATCGGTGGCTGTGACAAG  
 AACATGCCTGGATCTATGATTGCTATTGCTAATATGGATATCCCAGCTATTTTCGCCTATGGTGGAACCTATTGCACC  
 GGGAAATCTTGATGGTAAAGATATCGACTTGGTTTCTGTCTTTGAAGGTATCGGAAAAATGGAACACCGGTGACATG  
 ACAGCTGAGGACGTGAAACGCTTGAATGTAATGCCTGCCCTGGCTGGTGGTTGTTGGTATGTAATCTACTGCTA  
 ATACCATGGCAACTGCTATCGAAGTTCTAGGGATGAGTTTGCCAGGGTCACTCTCTACCCAGCTGAATCAGTGA  
 TAAGAAAGAAGATATCGAAGCAGCAGGACGTGCTGTTGTTAAGATGTTGGAACCTGGTCTCAAACCATCAGATATC  
 TTGACTCGTGAAGCCTTTGAAGATGCTATCACTGTAACGATGGCTCTCGGTGGTTCTACAAACGCCACTCTTCACTT  
 GCTCGCCATTGCCCATGCCGCAAAATGTTGACTTGTCACTTGAGGACTTCAATACGATTCAAGAACGTGTGCCTCACT  
 TGGCCGACTTGAACCATCTGGTCAGTATGTCTTCCAAGACCTCTACGAAGTCGGTGGTGTCCCTGCGGTTATGAA  
 GTATTTGTTGGCAAATGGTTTCCCTTCACGGAGATCGCATCACATGTACTGGTAAGACTGTAGCTGAAAACCTTGGCTG  
 ACTTTGCAGACTTGACTCCAGGCCAAAAAGTTATCATGCCACTTGAAAAATCCAAAACGTGCGGATGGTCCGCTTAT  
 CACTTTGAACGGGAACCTTGCTCCTGACGGTGACGTTGCCAAGGTATCAGGTGTTAAAGTGCCTCGTCACGTTGGG  
 CCAGCTAAGGTCTTTGACTCAGAAGAAGATGCGATTACAGGCCGTTCTGACAGATGAAATCGTTGATGGCGATGTAG  
 TCGTTGTTCTGTTTGTGGACCTAAAGGTGGTCTGGTATGCCTGAGATGCTATCACTTTCTTCAATGATTGTTGGTA  
 AAGGTCAGGGAGATAAGGTGGCCCTCTTGACGGACGGACGTTTCTCTGGTGGTACTTATGGTCTGGTTGTTGGACA  
 TATCGCTCCTGAAGCTCAGGATGGTGGACCAATTGCCTATCTCCGTACCGGCGATATCGTTACGGTTGACCAAGAT  
 ACCAAAGAAATTTCTATGGCCGTATCCGAAGAAGAACTTGAAAAACGCAAGGCAGAAACAACCTTGCCACCACTT  
 TACAGCCGTGGTGTCTCGGTAAATATGCCACATCGTATCATCTGCTTACCGCGGAGCCGTGACAGACTTCTGGA  
 ATATGGACAAGTCAGGTAAAAAATAA

(SEQ ID NO: 52)

MTELDKRHRSSYDSMVKSPNRAMLRATGMTDKDFETSIVGVISTWAENTPCNIHLHDFGKLAKGKVSAGAWPVQFG  
 TITVADGIAMGTPGMRFLTSRDIIADSIEAAMSGHNVDAFVAIGGCDKNMPGSMIAIANMDIPAIFYGGTIAPGNLDGK  
 DIDLVSVFEGIGKWNHGDMAEDVKRLECNACPGPGCGGMYTANTMATAIEVLGMSLPGSSHPAESADKKEDIEAA  
 GRAVVKMLELGLKPSDILTREAFEDAIVTMAALGGSTNATLHLLAIAHAANVDLSLEDFNTIQERVPHLADLKPSGQYVF  
 QDLYEVGGVPVAVMKYLLANGFLHGDRITCTGKTVAEENLADFADLTGPKQKVIIMPLENPKRADGPLIILNGNLAPDGAVA  
 KVSQVKKRRHVGPVDFDSEEDAIQAVLTDEIVDGDVVVVRVFGPKGGPGMPPEMLSLSSMIVGKGQGDVALLTDGR  
 FSGGTYGLVVGHIAPAQDGGPIAYLRTGDIVTVDQDTEISMAVSEEELEKRKAETTLPLYSRGVLGKYAHIVSSASR  
 GAVTDFWNMDKSGKK

#### **ID26 274bp**

(SEQ ID NO: 53)

ATGTTATAATAAAAAATAAGAATTTAAGGAGAAATACAATATGTCAATTTTTATTGGAGGAGCATGGCCATATGCA  
AACGGTTCGTTACATAATTGGTCACGCGGCAGCGCTTTTACCGGGGGATATTCTTGCAAGATACTATCGTCAGAAGG  
GAGAGGAAGTTTTATATGTTTCTGGAAGTGATTGTAATGGAACCCCTATTCTATCAGAGCTAAAAAGAAAAATAA  
GTCTGTGAAAGAAATTGCTGATTTTTATCATAAGGAATTTAATCCA

(SEQ ID NO: 54)

CYNKNKEFKYKYNMSIFIGGAWPYANGSLHIGHAAALLPGDILARYYRQKGEEVLYVSGSDCNGTPISIRAKKENKSVK  
EIADFYHKEFPN

#### ID28 1065bp

(SEQ ID NO: 55)

ATGACAACATTATTTTTCAAAAATTAAGAAGTAACAGAACTTGCTGCAGTCTCAGGTCATGAAGCGCCTGTCCTGT  
CTTATCTCTCGTGAAAAGTTGACACCGCATGTGGATGAAGTGGTGACAGATGGCTTGGGTGGTATTTTTGGTATCAA  
ACATTTCAGAAAGCTGTGGATGACACCGCGCGTCTTGGTCCGTTCTCATATGGACGAAGTTGGTTTTATGGTCAGCGAA  
ATCAAGCCAGATGGTACCTTCCGTGTCGTAGAAATCGGTGGCTGGAACCCCATGGTGGTTAGCAGCCAAACGTTTCA  
AACTCTTGACTCGTGATGGTCATGAAATTCCTGTGATTTCAAGTTCCTGTTCCCTCCGCATTTGACTCGTGAAAGGGG  
GGACCAACCATGCCAGCCATTGCCGATATCGTTTTTGTATGGTGGTTTTGCGGACAAGGCTGAGGCAGAAAGTTTTG  
GCATCCGTCTGGTGATACCATTTGTACCATAGTTCTGCAATTTTGACAGCCAATGAAAAAATATCATCTCAAA  
AGCTTGGGATAACCGCTACGGTGTCTCATGGTAAGCGAGCTAGCTGAAGCTTTATCGGGTCAAAAACTCGGCAAT  
GAAGTCTATCTGGGTTCTAACGTCCAAGAAGAAGTTGGTCTGCGTGGCGCTCATACCTCTACAACCAAGTTTGACC  
CAGAAGTCTTCTCGCAGTTGATTGCTCACCAGCAGGTGATGTCTACGGTGGTCAAGGCAAGATTGGAGATGGAAC  
CTTGATTCTGTTCTATGATCCAGGTCACCTGCTTCTCCAGGGATGAAGGATTTCTTTTGACAACGGCTGAAGAAG  
CTGGTATCAAGTACCAATACTACTGTGGTAAAGGCGGAACAGATGCAGGTGCAGCTCATCTGAAAAATGGTGGTGT  
CCCATCAACAACTATCGGTGTCTGCGCTCGTTATATCCATTCTACCAAAACCCTCTATGCAATGGATGACTTCCTAG  
AAGCGCAAGCTTTCTTACAAGCCTTGGTGAAGAAATTTGGATCGTTCAACGGTTGATTTGATTAAACATTATTAA

(SEQ ID NO: 56)

MTTLFSKIKEVTELAAVSGHEAPVRAYLREKLTPHVDEVVTDGLGGIFGIKHSEAVDAPRVLVASHMDEVGFMVSEIKP  
DGTFRVVEIGGWNPMVVSQRFKLLTRDGHEIPVISGSVPHLTRGKGGPTMPAIDIVFDGGFADKAEAESFGIRPGDTI  
VPDSSAILTANEKNIISKAWDNRYGVLMVSELAEALSGQKLGNELYLGSNVQEEVGLRGAHTSTTKFDPEVFLAVDCSP  
AGDVYGGQKGIGDGLIRFYDPGHLLPGMKDFLLTTAEAGIKYQYYCGKGGTDAGAHLKNGGVPTTIGVCARYI  
HSHQTLYAMDDFLEAQAFQLVKKLDRSTVDLIKHY

#### ID31 1182bp

(SEQ ID NO: 57)

ATGGAATTTTCTATGAAATCAGTCAAAGGACTACTCTTTATCATAGCTAGTTTTATCTTGACTCTTTTGACTTGGATG  
AACACTTCTCCCAATTTCATGATTCCAGGACTAGCTTTAACAAGCCTATCTCTGACTTTTATCTAGCCACTCGTCTC  
CCACTACTAGAAAGCTGGTTTCACAGTTTGGAGAAGGTCTACACCGTCCACAAATTCACAGCCTTTCTCTCAATCAT  
CCTACTAATCTTTTCATAAATTTAGTATGGGCGGTTTGTGGGGCTCTCGCTTAGCTGCTCAGTTTGGCAATCTTGCCAT  
CTATATCTTTGCCAGCATCATCTTGTGCGCTATTTAGGCAAAATACATCCAATACGAAGCTTGGCGATGGATTACCC  
GCCTGGTTTACCTAGCCTATATTTTAGGACTCTTTCACATCTACATGATAATGGGCAATCGTCTCCTTACATTTAATC  
TTCTAAGTTTTCTTGTGGTAGCTATGCCCTTTTAGGCTTACTAGCTGGTTTTATATCATTTTTCTATATCAAAAGAT  
TTCTTCCCCTATCTAGGGAAAAATTACCCATCTCAAACGCTTAAATCAGGATACTAGAGAAATTCAAATCCATCTTA  
GCAGACCTTTCAACTATCAATCAGGACAATTTGCCTTTCTAAAGATTTCCAAGAAGGCTTTGAAAGTGCTCCGCAT  
CCCTTTTCTATCTCAGGAGGTGATGGTCAAACCTTTTACTTTACTGTTAAAACTTCAGGCGACCATACCAAGAATAT  
CTATGATAATCTTCAAGCCGGCAGCAAAGTAACCTAGACAGAGCTTACGGACACATGATCATAGAAGAAGGACG  
AGAAAATCAGGTTTGGATTGCTGGAGGTATTGGGATCACCCCTTCATCTCTTACATCCGTGAACATCCTATTTTAG  
ATAAACAGGTTCACTTCTACTATAGCTTCCGTGGAGATGAAAATGCAGTCTACCTAGATTTACTCCGTAACATATGCT  
CAGAAAAATCCTAATTTTGAAGTCCATCTAATCGACAGTACGAAAGACGGCTATCTAATTTTGAACAAAAAGAG  
TGCCCGAACATGCAACCGTCTATATGTGTGGTCTATTTCTATGATGAAGGCACCTTGCCAAACAGATTAAGAAACA  
AAATCCAAAAACAGAGCATATTTAC

(SEQ ID NO: 58)

MEFSMKSVKGLLFIIASFILTLTWMNTSPQFMIPGLALTSLSLTFILATRLPLESWFHSLEKVVYTVHKFTAFLSIILLIFHN  
FSMGGWLWGSRLAAQFGNLAIFYASIIILVAYLGKYYQYEAWRWIHRLVYLAYILGLFHIYMIMGNRLTLFNLLSFLVGSY  
ALLGLLAGFYIIFLYQKISFPYLGKITHLRLNHDTRIQUIHLSPFNYSQSQFAFLKIFQEGFESAPHFISISGGHGQTLTYT  
VKTSGDHTKNIDNLQAGSKVTLDRAYGHMIIIEGRENQVWLAGGIGITPFISYIREHPILDKQVHFYYSFRGDENAVYL  
DLLRNYAQKNPNFELHLIDSTKDGYNFEQKEVPEHATVYMCGPISMMKALAKQIKKQNPKEHIY

#### ID32 900bp

(SEQ ID NO: 59)

ATGACTTTTAAATCAGGCTTTGTAGCCATTTTAGGACGTCCCAATGTTGGGAAGTCAACCTTTTAAATCACGTTAT  
GGGCAAAAAGATTGCCATCATGAGTGACAAGGCGCAGACAACGCGCAATAAAATCATGGGAATTTACACGACTGA

5 TAAGGAGCAAATTGTCTTTATCGACACACCAGGGATTCAACAAGCCTAAAAACGCTCTCGGAGATTTCATGGTTGAG  
TCTGCCTACAGTACCCCTTCGCGAAGTGGACACTGTTCTTTTCATGGTGCCTGCTGATGAAGCGCGTGGTAAGGGG  
ACGATATGATTATCGAGCGTCTCAAGGCTGCCAAGGTTCTGTGATTTTGGTGGTGAATAAAATCGATAAGGTCCA  
TCCAGACCAGCTCTTGTCTCAGATTGATGACTTCCGTAATCAAATGGACTTTAAGGAAATTTTCCAATCTCAGCCC  
10 TTCAGGGAATAACGTGTCTCGTCTAGTGGATATTTTGAAGTGAATACTGGATGAAGGTTTCCAATATTTCCCGTCT  
GATCAAATCACAGACCATCCAGAACGTTTCTTGGTTTCAGAAATGGTTCGCGAGAAAGTCTTGCACCTAACTCGTG  
AAGAGATTCCGCATTCTGTAGCAGTAGTTGTTGACTCTATGAAACGAGACGAAGAGACAGACAAGGTTACATCCG  
TGCAACCATCATGGTCGAGCGCGATAGCCAAAAAGGATTATCATCGGTAAGGTGGCGCTATGCTTAAGAAAAAT  
CGGTAGCATGGCCCGTCGTGATATCGAACTCATGCTAGGAGACAAGGTTCTCTAGAAACCTGGGTCAAGGTCAAG  
AAAAACTGGCGCGATAAAAAGCTAGATTTGGCTGACTTTGGCTATAATGAAAGAGAATACTAA

(SEQ ID NO: 60)

15 MTFKSGFVAILGRPNVGKSTFLNHVMGQKIAIMSDKAQTTTRNKIMGIYTTDKEQIVFIDTPGIHKPKTALGDFMVESAYS  
TLREVDTVLFMVPADAEARGKGDMMIERLKAAKVPVILVVKIDKVHPDQLLSQIDDFRNQMDFKEIVPISALQGNVSR  
LVDILSENLEDEGFQYFSPDQITDHPERFLVSEMVREKVLHLTREEIPHSVAVVVDMSMRDEETDKVHIRATIMVERDSQK  
GHIIGKGGAMLKKIGSMARRDIELMLGDKVFLETWVKVKKNWRDKKDLADFGYNEREY

### ID33 855bp

20 (SEQ ID NO: 61)

CTGCTTCTTGTTTTTACAGAAGGAGGACTTATGCCTGAATTACCTGAGGTTGAAACCGTTTGTCTGGCTTAGAAAA  
ATTGATTATAGGAAAGAAGATTTTCAGATATAGAAATTCGCTACCCCAAGATGATTAAGACGGATTGGAAGAGTTT  
CAAAGGGAATTGCCTAGTCAAGATTATCGAGTCAATGGGACGTCGTGGAAAAATTTGCTTTTATCTGACAGACA  
25 AGGTCTTGATTTCCCATTTGCCGATGGAGGGCAAGTATTTTACTATCCAGACCAAGGACCTGAACGCAAGCATGC  
CCATGTTTCTTTTCATTTTGAAGATGGTGGCAGCGTGTGTTATGAGGATGTTTCGCAAGTTTGAACCATGGAACCTCT  
TGGTGCCTGACCTTTTAGACGCTACTTTATTTCTAAAAAATTAGGTCTGAACCAAGCGAACAAGACTTTGATTTA  
CAGGTCTTTCAATCTGCCCTTGCCAAAGTCCAAAAAGCCTATCAAAATCCCATCTCCTAGACCAGACCTTGGTAGCTGG  
ACTTGGCAATATCTATGTGGATGAGGTTCTCTGGCGAGCTCAGGTTTCATCCAGCTAGACCTTCCCAGACTTTGACAG  
30 CAGAAGAAGCGACTGCCATTTCATGACCAGACCATTTGCTGTTTGGGCCAGGCTGTTGAAAAAGGTGGCTCCACCAT  
TCGGACTTATACCAATGCCTTTGGGGAAGATGGAAGCATGCAGGACTTTCATCAGGTCTATGATAAGACTGGTCAA  
GAATGTGTACGCTGTGGTACCATCATTTGAGAAAAATTCAACTAGGCGGACGTGGAACCCACTTTTGTCCAACTGTC  
AAAGGAGGGACTGA

(SEQ ID NO: 62)

35 MLLVFTEGGLMPELPEVETVCRGLEKLIIGKKISSIEIRYPKMIKTDLEEFQRELPSQIHESMGRRKYLLFYLTDKVLISHL  
RMEGYFYYPDQGPERRKHAHVFFHFEDGGLTVYEDVRKFGTMELLVPDLDVYFISKKLGPPEPSEQDFDLQVQFQSALA  
KSKKPIKSHLLDQTLVAGLGNIYVDEVLWRAQVHPARPSQTLTAEETAIHQDTIAVLGQAVEKGGSTIRTYTNAFGED  
GSMQDFHQVYDKTGQECVRCGTIIEKIQLGGRGTHFCPNCQRRD

### ID34 633bp

(SEQ ID NO: 63)

45 TTGTCCAACTGTCAAAGGAGGGACTGATGGGAAAAATCATCGGAATCACTGGGGGAATTGCCTCTGGTAAGTCA  
ACTGTGACAAATTTCTAAGACAGCAAGGCTTCAAGTAGTGGATGCCGACGCGATCGTCCACCAACTACAGAAAC  
CTGGTGGTCTGCTGTTTGAAGGCTCTAGTACAGCACTTTGGGCAAGAAATCATTCTTGAACACGGAGAACTCAATCG  
CCCTCTCCTAGCTAGTCTCATCTTTCAAATCCTGATGAACGAGAATGGTCTAAGCAAATTCAGGGGAGATTATCC  
GTGAGGAAGTGGCTACTTTGAGAGAACAGTTGGCTCAGACAGAAGAGATTTTCTTCATGGATATTTCCCTACTTTT  
50 GAGCAGGACTACAGCGATTGGTTTGTGAGACTTGGTTGGTCTATGTGGACCGAGATGCCCAAGTGGAAACGCTTAA  
TGAAAAAGGACAGATTGTCCAAAGATGAAGCTGAGTCTCGTCTGGCAGCCAGTGGCCTTTAGAAAAAAGAAAG  
ATTTGGCCAGCCAGGTTCTTGATAATAATGGCAATCAGAACAGCTTCTTAATCAAGTGCATATCCTTCTTGAGGGA  
GGTAGGCAAGATGACAGAGATTAA

(SEQ ID NO: 64)

55 MSKLSKEGLMGKIIIGITGGIASGKSTVTNFLRQQGFQVVDADAVVHQLQKPGGRLFEALVQHFGQEIIENGELNRPLLA  
SLIFSNPDEREWSKQIQGEIIREELATLREQLAQTEEIFMDIPLLFEQDYSDFWFAETWLVYVDRDAQVERLMKRDQLSK  
DEAESRLAAQWPLEKKKDLASQVLDNNGNQNLNQNQHILLEGGRQDDR

### ID35 1269bp

60 (SEQ ID NO: 65)

TTGATAATAATGGCAATCAGAACCAGCTTCTTAATCAAGTGCATATCCTTCTTGAGGGAGGTAGGCAAGATGACAG  
AGATTAACCTGGAAGGATAATCTGCGCATTGCCTGGTTGGTAATTTTCTGACAGGAGCCAGTATTTCTTGGTTGTA  
CCTTTTATGCCCATCTTCGTGAAAAATCTAGGTGTAGGGAGTCAGCAAGTCGCTTTTATGACAGGCTTAGCAATTC  
65 TGCTCTGCTATTTCCGCGGCGCTCTTTTCTCCTATTTGGGGTATTCTTGCTGACAAATACGGCCGAAAACCCATGAT  
GATTCGGGCAGGCTTGTCTATGACTATCACTATGGGAGGCTTGGCCTTTGTCCCAATATCTATTGGTTAATCTTTC  
TTCGTTTACTAAACGGTGTATTTGCAGGTTTTGTCTTAATGCAACGGCACTGATAGCCAGTCAGGTTCCAAAGGAG

AAATCAGGCTCTGCCTTAGGTACTTTGTCTACAGGCGTAGTTGCAGGTAAGTCTAACTGGTCCCTTTATTGGTGGCTT  
TATCGCAGAAATTATTTGGCATTTCGTACAGTTTCTTACTGGTTGGTAGTTTTCTATTTTACCTGCTATTTTGACTATT  
TGCTTTATCAAGGAAGATTTTCAACCAAGTAGCCAAGGAAAAGGCTATCCAACAAAGGAATTATTTACCTCGGTATA  
5 AATATCCCTATCTTTTGTCTCAATCTCTTTTAAACCAGTTTGTCTATCCAATTTTCAGCTCAATCGATTGGCCCTATTTT  
GGCTCTTTATGTACGCGACTTAGGGCAGACAGAGAATCTTCTTTTGTCTCTGGTTTGAATTGTGTCCAGTATGGGCT  
TTTCCAGCATGATGAGTGCAGGAGTCATGGGCAAGCTAGGTGACAAGGTGGGCAATCATCGTCTCTTGGTTGTCCG  
CCAGTTTTATTCAGTCATCATCTATCTCCTCTGTGCCAATGCCTCTAGCCCCCTCAACTAGGACTCTATCGTTTCCT  
CTTTGGATTGGGAACCGGTGCCTTGATTCCCGGGGTAAATGCCCTACTCAGCAAAATGACTCCCAAAGCCGGCATT  
10 TCGAGGGTCTTTGCCTTCAATCAGGTATCTTTTATCTGGGAGGTGTGTGGTCCCATGGCAGGTTCTGCAGTAGC  
AGGTCAATTTGGCTACCATGCTGTCTTTATGCGACAAGCCTTTGTGTGCCTTTAGTTGTCTCTTAACTGATTCA  
ATTTCAACATTATTAAGTAAAGGAAATCTAG

(SEQ ID NO: 66)

MIIMAIRTSFLIKCISFLREVGMTEINWKDNLRIAWFGNFLTGASISLVVFPMPFIVENLVGVSQQVAFYAGLAISVSAIS  
15 AALFSPWILADKYGRKPMIRAGLAMTITMGGLAFFVNIYWLIFLRLNNGVFAGFVFNATALIASQVPKEKSGSALGT  
LSTGVVAGTLTGPFIFGFIAGLFGIRTVLLVGSFLFLAAILTICFIKEDFQPVAKKAIPTKELFTSVKYPYLLNLFLLTSFVI  
QFSAQSIGPILALYVRDLGQTNLLFVSLIVSSMGFSSMMSAGVMGKLGDKVGNHRLLVVAQFYSVIIYLLCANASSPL  
QLGLYRFLFGLGTGALIPGVNALLSKMTPKAGISRVAFAFNQVFFYLGGVVGPMAAGSAVAGQFYGAVFYATSLCVAFS  
20 CLFNLIQFRTLLKVKEI

**ID36 1311bp**

(SEQ ID NO: 67)

ATGGCCCTACCAACTATTGCCATTGTAGGACGTCCCAATGTTGGGAAATCAACCCTATTTAATCGGATCGCTGGTG  
25 AGCGAATCTCCATTGTAGAAAGATGTGCAAGGAGTGACACGTGACCGTATTTATGCAACGGGTGAGTGGCTCAATCG  
TTCTTTTAGCATGATTGATACAGGAGGAATTGATGATGTGCTGCTCTTTCATGGAACAAATCAAGCACCAGGCA  
GAAATTTGCCATGGGAAGCAGATGTTATCGTTTTTGTCTGGTAAGGAAGGAATTACTGATGCAGACGAAT  
ACGTAGCTCGTAAGCTTTATAAGACCCACAAACCAGTTATCCTCGCAGTCAACAAGGTGGACAACCTGAGATGAG  
30 AAATGATATATATGATTTCTATGCTCTCGGTTTGGGTGAACCATTGCCATCTCATCTGTCCATGGAATCGGTACAG  
GGGATGTGCTAGATGCGATCGTAGAAAAATCTTCCAAATGAATATGAGGAAGAAAAATCCAGATGTCATTAAAGTTTAG  
CTTGATTGGTCGTCCTAACGTTGGAAAAATCAAGCTTGATCAATGCTATCTTGGGAGAAGACCGTGTATTGCTAGTC  
CTGTTGCTGGAACTCGTGATGCCATTGATACCCACTTTACAGATACAGATGGTCAAGAGTTTACCATGATTGAT  
ACGGCTGGTATGCGTAAGTCTGGTAAGGTTTATGAAAAATCTGAGAAATACTCTGTTATGCGTGCCATGCGTGCTA  
35 TTGACCGTTTCAGATGTGGTCTTGATGGTCATCAATGCGGAAGAAAGGCATTTCGTGAGTACGACAAGCGTATCGCAGG  
ATTTGCCCATGAAGCTGGTAAAGGGATGATTATCGTGGTCAACAAGTGGGATACGCTTGAAAAAGATAACCACT  
ATGAAAAACTGGGAAGAAGATATCCGTGAGCAGTTCCAATACCTGCCTTACGCACCGATTATCTTTGTATCAGCTT  
TAACCAAGCAACGCTCCACAACTTCTGAGATGATTAAGTCAAAATCAGCGAAAGTCAAAATACACGTATTCCATC  
AGCTGTCTTGAACGATGTCTATCATGGATGCCATTGCCATCAACCCAAACACCGACAGACAAAGGAAACCGTCTCAAG  
40 ATTTTCTATGCGACCAAGTGGCAACCAAAACCAACCTTTGTCTATCTTTGTCAATGAAGAAGAACTCATGCACTT  
TTCTTACCTGCGTTTCTTGAAAAATCAAATCCGCAAGGCCTTTGTTTTTGAGGGAACACCGATTCACTCATCGCAA  
GAAAACGCCAAATAA

(SEQ ID NO: 68)

MALPTIAIVGRPNVGKSTLFNRIAGERISIVEDVEGVTRDRIYATGEWLNRSFSMIDTGGIDDVDAPFMEQIKHQAEIAME  
45 EADVIVFVVGKEGITDADEYVARKLYKTHKPVILAVNKVDNPEMRNDIYDFYALGLGEPLPISSVHGIGTGDVLDIAIVE  
NLPNEYEEENPDVIKFSLIGRPNVGKSSLINAILGEDRVIASPVAGTTRDAIDHTDIDTGDQEFMTIDTAGMRKSGKVYEN  
TEKYSVMRAMRAIDRSDDVLMVINAEEGIREYDKRIAGFAHEAGKGMIIIVNKNWDTLEKDNHTMKNWEEDIREQFQY  
LPYAPIIFVSALTQRLHKLPEMIKQISESQNTRIPSAVLNDVIMDAIANPTPTDKGKRLKIFYATQVATKPPTFVIFVNEE  
50 ELMHFSYLRFLFNQIRKAFVFEGTPIHLIARKRK

**ID37 714bp**

(SEQ ID NO: 69)

ATGACAGAAACCATTAATTTGATGAAGGCTCATACTTTCAGTGCGCAGGTTTAAAGAGCAAGAAATTTCCCAAGTA  
55 GACTTAAATGAGATTTTGACAGCAGCCCAGATGGCATCATCTTGGAAAGAATTTCCAATCCTACTCTGTGATTGTGGT  
ACGAAGTCAAGAGAAGAAAGATGCCTTGTATGAATTGGTACCTCAAGAAGCCATTGCCAGTCTGCTGTTTTCTT  
CTCTTTGTGCGAGATTTGAACCGAGCAGAAAAAGGGAGCCCGACTTCATACCGACACCTTCCAACCCCAAGGTGTGG  
AAGGTCTCTTGATTAGTTCCGTGATGCAGCTCTTGTGGACAAAACGCCTTGTGGCAGCTGAAAGCTTGGGCTAT  
60 GGTGGTGTGATTATCGGTTTGGTTCGATACAAGTCTGAAGAAGTGGCAGAGCTCTTAACTTACCTGACTACACCT  
ATTCTGTCTTTGGGATGGCACTGGGTGTGCCAAATCAACATCATGATATGAAACCGAGACTGCCACTAGAGAATGT  
TGTCTTTGAGGAAGAATACCAAGAAGTCAACTGAGGCAATCCAAGCTTATGACCGTGTTCAGGCTGACTATGCT  
GGGCGCGTGGCAGCACCAAGCTGGAGTCAGCGCTAGCAGAACAGTTTGGTCAAGCTGAACCAAGCTCAACTAGA  
AAAAATCTTGAACAGAAGAAATTTATTGTAG

(SEQ ID NO: 70)

MTETIKLMKAHTSVRRFKEQEIQVDLNEILTAAQMASSWKNFQSYSVIVRSQEKKDALYELVPQEAIRQSAVFLFLVFG  
DLNRAEKGARLHTDTFPQGVGLLISSVDAALAGQNALLAAESLGYGGVIIGLVRYKSEEAELFNLDPDYTSVFGMA  
LGVPNQHMDMKPRLPLENVVFEEYQEQSTEAIQAYDRVQADYAGARATTSWSQRLAEQFGQAEPSSTRKNLEQKKLL

5 **ID38 729bp**

(SEQ ID NO: 71)

10 ATGACAGAAATTAGACTAGAGCACGTCAGTTATGCCTATGGTCAGGAGAGGATTTAGAGGATATCAACCTACAG  
GTGACTTCAGGCCAAGTGGTTTCCATCCTAGGCCCAAGTGGTGTGGAAAGACCACCTCTTAACTAATCGCTG  
GGATTTTAGAAGTTCAGTCAGGGAGAATTGCTTGTGATGGTGAAGAAAAATCCCAAGGGGCGCGTGAGTTATATGTT  
GCAAAAAGGATCTGCTCTTGGAGCACAAGACGGTGTGGAAATATCATTCTGCCCTCTTGATTCAAAAGGTGGAT  
AAGGCAGAAGCTATTTCCCGAGCGGATAAAATTTCTTGCAGCTTCCAGCTGACAGCTGAAGAGACAAGTATCCTC  
ATGAACTTAGCGGTGGGATGCGCCAGCGTGTAGCCTTACTCCGGACCTACCTTTTGGGCACAAGCTCTTCTCTTA  
15 GATGAGGCCTTTAGCGCTTGGATGAGATGACAAAGATGGAACCTCACGCTTGGTATCTTGAGATTACAAAGCAGT  
TGCAGCTAACAAACCTGATCATCACGCATAGTATTGAGGAGGCCCTCAATCTCAGCGACCGTATCTATATCTTGAA  
AAATCGCCCTGGGCAGATTGTTTCAGAAATAAACTAGATTGGTCTGAAGATGAGGACAAGGAAGTCCAAAAGAT  
TGCTACAAACGTCAAATTTGGCGGAATTAGGCTTAGATAAGTAG

(SEQ ID NO: 72)

20 MTEIRLEHVSYAYGQERILEDINLQVTSGEVVSILGPSGVGKTTLFNLIAGILEVQSGRIVLDGEENPKGRVSYMLQKDLL  
LEHKTVLGNILPLLIQKVDKAEAISRADKILATFQLTAVRDYKPHELSGGMQRQVALLRITYLFGHKLFLLDEAFSALDE  
MTKMELHAWYLEIHKQLQLTTLIITHSIEEALNLSDRYILKNRPQIVSEIKLDWSEDEDKEVQKIAYKRQILAEGLDK

25 **ID39 2433bp**

(SEQ ID NO: 73)

30 ATGAACTATTCAAAAGCATTGAATGAATGTATCGAAAGTGCCTACATGGTTGCTGGACATTTTGGAGCTCGTTATCT  
AGAGTCGTGGCACTTGTGATTGCCATGTCTAATCACAGTTATAGTGTAGCAGGGGCAACTTTAAATGATTATCCGT  
ATGAGATGGACCGTTTAGAAGAGGTGGCTTTGGAAGTACTGACTGAAACGGACTATAGCCAGGATGAAACCTTTACGG  
AATTGCCGTTCTCCCGTCGTTTGCAGTTCTTTTGTGATGAAGCAGAGTATGTAGCGTCAGTGGTCCATGTCTAAGGTA  
CTAGGGACAGAGCACGTCCTCTATGCGATTTTGCATGATAGCAATGCCTTGGCGACTCGTATCTTGGAGAGGGCTG  
GTTTTTCTTATGAAGACAAGAAAGATCAGGTCAAGATTGCTGCTCTTCGTCGAAATTTAGAAGAACGGGCAGGCTG  
GACTCGTGAAGATCTCAAGGCTTTACGCCAACGCCATCGTACAGTAGCTGACAAGCAAAATTTCTATGGCCAATATG  
ATGGGCATGCCGCAGACTCCTAGTGGTGGTCTCGAGGATTATACGCATGATTTGACAGAGCAAGCGCTTCTGGCA  
35 AGTTAGAACCAGTCATCGGTCGGGACAAGGAAATCTCACGTATGATTCAAATCTTGAGCCGGAAGACTAAGAACA  
ACCCTGTCTTGGTTGGGGATGCTGGTGTGGGAAAACAGCTCTGGCGCTTGGTCTTGCCAGCGTATTGCTAGTGGT  
GACGTGCTGCGGAAATGGCTAAGATGCGCTGTTAGAAGTGAATTTGATGAATGTCGTTGACGGGACACGCTTCC  
GTGGTGACTTTGAAGAACGCATGAATAATATCATCAAGGATATTGAAGAAGATGGCCAAGTCATCCTCTTTATCGA  
TGAAGTCCACCATCATGGGTTCTGGTAGCGGGATTGATTGCGACTCTGGATGCGGCAATATCTTGAAGCAAGCC  
40 TTGGCGCGTGGAACTTTGAGAACGGTTGGTGCCACTACTCAGGAAGAATATCAAAAACATATCGAAAAAGATGCG  
GCATTTTCTCGTCTGTTTCGCTAAAGTGACGATTGAAGAACCAAGTGTGGCAGATAGTATGACTATTTTACAAGGTTT  
GAAGGCGACTTATGAGAAACATCACCGTGTACAAATCACAGATGAAGCGGTTGAAACAGCGGTTAAGATGGCTCA  
TCGTTATTTAACCAGTCGTCATTTGCCAGACTCTGCTATCGATCTCTTGGATGAGGCGGCAGCAACAGTGCAAAAT  
45 AAGGCAAGCATGTAAAAGCAGACGATTGAGTTTGAAGTCCAGCTGACAAGGCCCTGATGGATGGCAAGTGGAAA  
CAGGCAGCCAGCTAATCGCAAAAAGAGAGGAAGTACCTGTCTACAAAGACTTGGTGACAGAGTCTGATATTTTG  
ACCACCTTGAGTCGCTTGTGAGGAATCCAGTTCAAAAAGTACTCAAAACGGATGCTAAGAAGTATTTAAATCTTG  
AAGCAGAACTCCATAAACGGGTTATCGGTCAAGATCAAGCTGTTTCAAGCATTAGCCGTGCCATTGCGCGCAACCA  
GTCAGGGATTGCGAGTCATAAGCGTCCGATTGGTTCCTTATGTTCCCTAGGGCTACAGGTGTCGGGAAAAGTGA  
50 TTAGCCAAGGCTCTGGCAGAAGTCTTTTGTGACGACGAATCAGCCCTTATCCGCTTTGATATGAGTGAGTATATGGA  
GAAATTTGCAGTAGTCGTCTCAACGGAGCTCCTCCAGGCTATGTAGGATATGAAGAAGGTGGGGAGTTGACAGA  
GAAGGTTGCAATAAACCTATTCCGTTCTCTCTTTGATGAGGTAGAGAAGGCCCAACCCAGATATCTTTAATGTTT  
TCTTGCAGGTTCTGGATGACGGTGTCTTGACAGATAGCAAGGGACGCAAGGTGATTTTCAAATACCATATCATT  
ATGACATCGAATCTAGGTGCGACTGCCCTTCGTGATGATAAGACTGTTGGTTTGGGGCTAAGGATATTCGTTTGA  
55 CCAGGAAAAATATGGAAAAACGCATGTTTGAAGAAGTGAAGAAAGCTTATAGACCGGAATTCATCAACCGTATTGA  
TGAGAAGGTGGTCTCCATAGCCTATCTAGTGATCATATGCAGGAAGTGGTGAAGATTATGGTCAAGCCTTATGTTG  
GCAAGTTTGAAGTGAAGAAAGGCATTGACTTGAATTTACAAGCTTCAGCTCTGAAATTTGTTAGCAATCAAGGATATG  
ACCCAGAGATGGGAGCTCGCCCACTTCGCAGAACCTGCAAAACAGAAGTGGAGGACAAGTTGGCAGAACTTCTTC  
TCAAGGGAGATTTAGTGGCAGGCAGCACACTTAAGATTGGTGTCAAAGCAGGCCAGTTAAATTTGATATTGCATA  
60 A

(SEQ ID NO: 74)

65 MNYSKALNECIESAYMVAGHFGARYLESWHLLIAMSNHSYSVAGATLNDYPYEMDRLEEVALELTETDYSQDETFTL  
PFSRRLQVLFDEAEYVASVVHAKVLGTEHVLVAILHDSNALATRILERAGFSYEDKKDQVKIAALRRNLEERAGWTRED  
LKALRQRHRTVADKQNSMANMMGMPQTPSGGLEDYTHDLTEQARSGLKLEPVIGRDKEISRMQILSRKTKNNPVLVGD  
AGVGKTALALGLAQRIASGDVPAEMAKMRVLELDMNVVAGTRFRGDFEERMNNIIKDIEEDGQVILFIDELHTIMSG  
SGIDSTLDAANILKPALARGTLRTVGATTQEEYQKHIEKDAALSRRFAKVITIEEPSVADSMITLQGLKATYEKHHRVQIT

DEAVETAVKMAHRYLTSRHLPSAIDLLDEAAATVQNKAKHVKADSDLSPADKALMDGKWQAAQLIAKEEEVPV  
YKDLVTESDILITLSRLSGIPVQKLTQTDAKKYLNLAEHLKRVIGQDQAVSSISRAIRRNQSGIRSHKRPISFMFLGPTG  
VGKTELAKALAEVLFDDDESALIRFDMSEYMEKFAASRLNGAPPYVGYEEGGELTEKVRNKPYSVLLFDEVEKAHPDIF  
5 NVLLQVLDDGVLTDSKGRKVDFSNTIIHMTSNLGAALRDDKTGVFGAKDIRFDQENMEKRMFEELKKAYPEFINRIDE  
KVVFHSLSSDHMQEVVKIMVKPLVASLTEKGIDLKLQASALKLLANQGYDPEMGARPLRRTLQTEVEDKLAELLKGD  
LVAGSTLKIGVKAGQLKFDIA

**ID40 1008bp**

(SEQ ID NO: 75)

ATGAAGAAAAACATGGAAAGTGTTTTAACGCTTGTAACAGCTCTGTAGCTGTTGTGCTTGTGGCCTGTGGTCAAG  
GAAGTCTTCTAAAGACAACAAAGAGGCAGAACTTAAGAAGGTTGACTTTATCCTAGACTGGACACCAATAACCA  
10 ACCACACAGGGCTTTATGTTGCCAAGGAAAAAGGTTATTTCAAAGAAGCTGGAGTGGATGTTGATTTGAAATTGCC  
ACCAGAAGAAAGTTCTTCTGACTTGGTTATCAACGGAAAGGCACCATTTGCAGTGTATTTCCAAGACTACATGGCT  
15 AAGAAATGGAAAAAGGAGCAGGAATCACTGCCGTTGCAGCTATTGTTGAACACAATACATCAGGAATCATCTCTC  
GTAATCTGATAATGTAAGCAGTCCAAAAAGACTTGGTTGGTAAGAAAAATATGGGACATGGAATGACCAACTGAAC  
TTGCTATGTTGAAAACCTTGGTAGAATCTCAAGGTGGAGACTTTGAGAAGGTTGAAAAAGTACCAATAACGACTC  
AAACTCAATCACACCGATTGCCAATGGCGTCTTTGATACTGCTTGGATTACTACGGTTGGGATGGTATCCTTGCTA  
20 AATCTCAAGGTGTAGATGCTAATTCATGTACTTGAAGACTATGTCAAGGAGTTTGACTACTATTCACCAGTTATC  
ATCGCAACAAACGACTATCTGAAGATAACAAAGAAGAAGCTCGCAAGTCATCCAAGCCATCAAAAAAGGCTAC  
CAATATGCCATGGAACATCCAGAAGAAGCTGCAGATATTCTCATCAAGAATGCACCTGAACCTCAAGGAAAAACGT  
GACTTTGTCATCGAATCTCAAAAACTTTGTCAAAGAATAACGCAAGCGACAAGGAAAAATGGGGTCAATTTGAC  
GCAGCTCGCTGGAAATGCTTTCTACAAATGGGATAAAGAAAAATGGTATCCTTAAAGAAGACTTGACAGACAAAGGC  
25 TTCACCAACGAATTTGTGAATAA

(SEQ ID NO: 76)

MKKTWKVFLTLVLTALVAVVLVACGQGTASKDNKEAELKKVDFILDWTPNTNHTGLYVAKEKGYFKEAGVDVDLKL  
PEESSDLVINGKAPFAVYFQDYMAKKLEKGAGITAVAAIVEHNTSGIISRKSDNVSSPKDLVGKKYGTWNPTELAML  
KTLVESQGGDFEKVEKVPNNDSNSITPIANGVFDTAWIY YGWDGILAKSQGV DANFMYLKDYVKEFDY YSPV IANND  
30 YLKDKNKEEARKVIAIKKGYQYAMEHPAEAADILIKNAPELKEKRDVIESQKYLKEYASDKEKWGFDAARWNAFY  
KWDKENGILKEDLTDKGFTNEFVK

**ID41 762bp**

(SEQ ID NO: 77)

TTGATGAGAACTTGAGAAGTATACTGAGACGACACATTAGTCTATTGGGCTTTCTCGGAGTATTGTCAATCTGGC  
AGTTAGCAGGTTTTCTTAACTTCTCCCAAGTTTATCCTGCCGACACCTCTTGAAATCTCCAGCCCTTTGTTCTGTG  
ACAGAGAATTTCTCTGGCACCATAGCTGGGCGACCTTGAGAGTGGCTTTACTGGGGCTGATTTGGGAGTTTGTGATT  
40 GCCTGTCTTATGGCTGTGCTCATGGATAGTTTGACTTGGCTCAATGACCTGATTTACCTATGATGGTGGTCAATCA  
GACCATTCGGACCATTGCCATAGCTCCTATCCTGGTCTTGTGGCTAGGTTATGGGATTTTGCCCAAGATTGCTTGA  
TTATCTTAACGACAACCTTTCCCATCATCGTTAGTATTTTGGACGGTTTTAGGCATTGCGACAAGGATATGCTGACC  
TTGTTTAGTCTGATGCGGGCCAAGCCTTGGCAAACTCCTGTGGCATTTTAAAAATCCCAGTTAGCCTGCCTTACTTTTA  
TGCAGGTCTGAGGGTCAAGTGTCTCCTACGCCCTTTATCACAACTGTGGTATCTGAGTGGTTGGGAGGTTTGAAGGTC  
45 TTGGTGTTTATATGATTCAGTCTAAAAAACTGTTTCAAGTATGATACCATGTTTGCCATTATTATCTGGTGTGCTGATTA  
TCAGTCTTTTGGGTATGAAGCTGGTTCGATATCAGTGAAAAATATGTGATTAAATGGAAACGTTCTCGTAG

(SEQ ID NO: 78)

MMRNLSILRRHISLLGFLGVLSIWQLAGFLKLLPKFILPTPLEILQPFVRDREFLWHHSWATLRVALLGLILGVLIACLM  
AVLMDSLTWLNDLIYPMMVVIQTIPTIAIAPILVLWLGYGILPKIVLIILTTTFPIIVSILDGFRHCDKMDLTLFSLMRAKPW  
50 QILWHFKIPVSLPYFYAGLRVSVSYAFITTVVSEWLGGFEGLVGYMIQSKLKFQYDTMFAIILVSIISLLGMKLVLDISEKY  
VIKWKRS

**ID42 372bp**

(SEQ ID NO: 79)

TTGATTTTAAATCCTATTTGCTGTATGATAAGGGAAAAAGAAAGGGGACAGAGATATGGCTTTTACCAATACCCACA  
TGCGATCTGCTAGTTTTGGTATTGTTACCAGCTTGCTGATGACATCATTGACTCTTTTGGTATATCATCGACCATT  
TCTTAAAAAATGCTTTGAATTGGAAGAAGAACTCGAGTTTCAATTGCTTAAATAACCAAGGAAAGATTACCTTCCA  
60 CTTTTCAAGTCAACACCTCCCTACAGCCATTGATTTTGACTTTAACCATCCTTTCCGACCTCGTTATCCCCCAAGAGT  
ACTGGTTTTAGACATGGACGGTAGAGAACTATCCTCCTCCCAAGAAAAATGACCTATTTTAA

(SEQ ID NO: 80)

MIFNPICCMIREKKGDRDMAFTNTHMRSASFIVTSLPDDIIDSFWYIIDHFLKNVFELEEELEFQLLNNQGKITFHSSQH  
LPTAIDFDFNHPDPR YPPRVLVLDMDGRETILLPEENDLF

**ID43 1569bp**

(SEQ ID NO: 81)

5 ACACGCGGTGTCATTCTATCTATTTTAAAGAAAAGTAATAATCAATTGTTAAAAATAGTAAAAAAATTGGAGGTTCTG  
 ATGAAATATTTTGTTCCTAATGAGGTATTCAGTATTCGTAAATTAAGGTGGGGACTTGCTCGGTAATTTGGCAAT  
 10 TTCAATTTTGGGAAGCCAAGGTATTTATCGGATGAAGTTTAAAGTGTAAAAAGATTATGGTGCACTAGGTGATGGGATT  
 CTAATGCAATTACTAATGATTTAGATAATTCACCAACTGTTAATCAGAATCGTTCTGCTGAAATGATTGCCTCTAAT  
 TCAACCCTAATGGTTTAGATAATTCGTTAAGTGTTAATAGCATCAGCTCTAATGGTACTATTCGTTCCAATTCACA  
 ATTAGACAACAGAACAGTTGAATCTACAGTAACATCTACTAATGAAAAAAGAGTTATAAGGAAGATGTTATAAG  
 15 TGACAGAATTATCAAAAAAGAAATTTGAAGATACTGCTTTAAAGTGTAAAAAGATTATGGTGCACTAGGTGATGGGATT  
 CATGATGATCGACAAGCAATTCAAGATGCAATAGATGCTGCAGCTCAAGGGCTAGGTGGAGGAAATGTATATTTTC  
 CTGAAGGAACCTTATTTAGTAAAAAGAAATTTGTTTTTTAAAAAGTCATACACACTTAGAATTGAATGAGAAAGCTAC  
 AATTCTAAATGGTATAAAATATTAAGAAATCACCTTCCATTGTTTTTATGACAGGTTTATTTACGGATGATGGTGCGC  
 AAGTAGAATGGGGCCCAACAGAAGATATTAGTTATTCTGGTGGTACGATTGATATGAACGGTGCTTTGAATGAAGA  
 AGGAACATAAGCAAAAAATCTACCACTTATAAAATCTTCAGGTGCATTTGCTATTGGGAATTCAAATAACGTAAC  
 20 ATAAAAATGTAACTTCAAGGATAGTTATCAAGGGCATGCTATTCAAATTGCAGGTTTCGAAAAATGTATTAGTTG  
 ATAATTTCTCGTTTCTTGGGCAAGCCTTACCCAAAACGATGAAGGATGGGCAATCATAAAGTAAGGAGAGCATTC  
 GATTGAACCATTAAGTAAAAAGGTTTTCTTATGCCTTGAATGATGATGGGAAAAATCTGAAAAATGTGACTATT  
 CAAAAATTCCTATTTTGGCAAAAGTGATAAATCTGGGGAATTAGTAACAGCAATTGGCACACACTATCAAACATTGT  
 CGACACAGAACCCTCTAATATTAATAATCAAAATTAATCATTTTATAACATGATGTATGCAGGTGTACGTTTACA  
 25 GGATTCACGTGATTTAATCAAGGAAATCGCTTTGATAAGAAAGTTAAAGGAGAGAGATGATACATTATCGGAC  
 MTGLFTDDGAQVWGPTEDISYSGGTIDMNGALNEEGTKAKNPLINSSGAFAIGNSNNVTIKNVTFKDSYQGHAIQIAG  
 AGCGGAGCAGCTTTAGTAAATGCTTATAGCTATAAAAAACACTAAAGACCTATTAGATTTAAATAAACAGGTGGTTA  
 TCGCCGAAAAATATTTAATATTGCCGATCCTAAAAACAAAGCGATACGAGTTGCAAAAGATAGTGCAGAATGTTT  
 AGGAAAAGTATCAGATATTACTGTAACAAAAAATGTAATTAATAATTAAGGAAACAGAACAAACCAATAT  
 30 TGAATTATTACGAGTTAGTGATAATTTAGTAGTCTCAGAGAATAGT

(SEQ ID NO: 82)

QRCHSIYFKKSNNQLLKIVKKLEVLMKYFVPNEVFSIRKLKVGTCVLLAISILGSQGILSDEVVTS SSPMATKESSNAITN  
 DLDNSPTVNQNRSAEMIASNSTTNGLDNSLSVNSISSNGTIRNSQLDNRTVESTVTSTNENKSYKEDVISDRIIKKEFEDT  
 35 ALSVKDYGAVGDDGIHDDRQAIQDAIDAAAQGLGGGNVYFPEGTYLVKEIVFLKSHTHLELNEKATILNGINIKNHPSIVF  
 MTGLFTDDGAQVWGPTEDISYSGGTIDMNGALNEEGTKAKNPLINSSGAFAIGNSNNVTIKNVTFKDSYQGHAIQIAG  
 SKNVLDNSRFLGQALPKTMKDGQIISKESIQIEPLTRKGFYALNDDGKKSENVTIQNSYFGKSDKSGELVTAIGTHYQT  
 LSTQNPNIKIQNNHFDNMMYAGVRFTGFTDVLIKGNRFDKKVKGESVHYRESGAALVNAYS YKNTKDLLDLNKQVVI  
 AENIFNIADPKTKAIRVAKDSAELGKVSDITVTKNVINNNSKETE QPNIELLRVSDNLVSVENS

**ID44 324bp**

(SEQ ID NO: 83)

40 GTGATGAAAGAACTCAGCTATTTAAAGGTGTTCTTGAAGGTTGTGCTTGGATATGATTGGTCAAAAAGAGCGGT  
 ATGGTTATGAGTTGGTTTCAGACTTTGCGAGAGGCTGGATTGATACTATCGTTCCAGGAACCTATTATCCTTTGTTG  
 CAAAAGTTAGAAAAAATCAATGGATAAGAGGCGACATGCCGCCGTCGCCAGATGGTCCAGATCGGAAGTATTTT  
 TCATTAATGAAAGAAAGGAGAAGCGGTGTCTCAGTCTTTTGGCAACAAATGGGACGATTTGAGTCAAAAAGTAGAA  
 GGGATTAAGAATGGGGTTAA

(SEQ ID NO: 84)

45 MMKETQLLKGVLGCVLDMIGQKERYGYELVQTLREAGFDIVPGTIYPLLQKLEKNQWIRGDMRSPDGPDRKYFSL  
 MKEGEERSVSFVWQQWDDLSQKVEGIKNGG

**ID45 816bp**

(SEQ ID NO: 85)

50 ATGAAGAAAAATGAAGTATTACGAAGAAAAACAAGCGCTTTGCTACATGAGTTTTCTGAGGAGAATCAAAAGTATTTTG  
 AGGAGTTGTGGGAAAGTTTAAATCTTGCTGGATTTCTCTATGATGAAGACTATCTCAGAGAGCAGATCTATTGATG  
 ATGCTAGATTTCTCAGAAGCAGAACGAGATGGCATGAGTGCAGAGGATTATCTAGGTAAGAATCCTAAAAAATA  
 55 ATGAAAGAGATTCTCAAGGGAGCACCTCGCAGTTCTATCAAAGAGTCCCTTTTGACGCCAATTTCTGCTCTGGCGG  
 TATTACGTTATTCAACTACTAAGTGATTTTCTAAAGGTCCCTCTCTTAACAGTCAATTTGCTACATTTTTAGGGC  
 AACTTCTTATTTTTCTGATTGGATTTGGACTTGTGGCCACAATTTTACGAAGAAGTTTGTCCAAGATTCTCTAAA  
 ATGAAAAATTGGCACTTACATTGTTGTTGGGACTATAGTTCTTCTAGTTGTTTTAGGATATGTAGGAATGGCAAGCTT  
 CATACAAGAAGGAGCCTTTATATCCGGCTCCCTGGGATAGTTGTCTGTCTTTACGATTTTCGCTAGTTATCGGTA  
 60 TTTGGAATTGGAAAGAAGCGGTCTTTTCGTCATTGTGCAGATGATTATTGCCCATCTTGTGGTGGGTTCTCTGCTCC  
 GTTATTATGAGTGGATGGGAATTTCAAATGTTTTCTTACAAAAGTTATTCCTTTAGCTGTCTCTTTATTGGAATCT  
 TTGCTTGTTCGTTGGTTTAAAGAAGATAAAATGGAGTGAAGTATAG

(SEQ ID NO: 86)

65 MKKMKYEEETSALLHEFSEENQKYFEELWESFNLAGFLYDEDYLRQIYLMMLDFSEAERDGMSEAEDYLGNPKKIM  
 KEILKGAPRSSIKESLLTPILVLAVLRYQLLSDFSKGPLLTVNLLTFLGQLLIFLIGFLVATILRRSLVQDSPKMKIGTYIV

5

CTGTTTTTTTATTTATACTCAATGAAAATCAAAGAGCAAACCTAGGAAGCTAGCCGCAGGTTGCTCAAACACTGTTT  
TGAGGTTGTAGACGAAATGACGAAGTCAGCTCAAAACATGTTTTGAGGTTGTAGATGAAACTGACGAAGTCAGC  
TCAAACACTGTTTTGAGGTTGTAGATGAAACTGACGAAGTCAGCTCAAAACACTGTTTTGAGGTTGTAGATGAAA  
CTGACGAAGTCAGCTCAAAACATGTTTTGAGGTTGTAGATGAAACTGACGAAGTCAGTAACCATACATACGGTAG  
GGCGACGCTGACGTGGTTTTGAAGAGATTTTCGAAGAGTATTAA

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**ID49 1200bp**

(SEQ ID NO: 93)

5 ATGAAGAAAAAGAAATGGTAAAGCTAAAAAGTGGCAACTGTATGCAGCAATCGGTGCTGCGAGTGTAGTTGTATTG  
GGTGTCTGGGGGATTCTTACTCTTTAGACAACCTTCTCAGACTGCTCTAAAAGATGAGCCTACTCATCTTGTGTGTC  
CAAGGAAGGAAGCGTGGCCCTCTCTGTTTTATTGTCTAGGGACAGTAACAGCAAAAAATGAACAATATGTTTTATTT  
10 GATGCTAGTAAGGGTGATTTAGATGAAATCCTTGTTTCTGTGGGCGATAAGGTACAGCGAAGGGCAGGCTTTAGTCA  
AGTACAGTAGTTCAGAAGCGCAGGCGGCCTATGATTACAGCTAGTCGAGCAGTAGCTAGGGCAGATCGTCATATCA  
ATGAACTCAATCAAGCACGAAATGAAGCCGCTTCAGCTCCGGCTCCACAGTTACCAGCGCCAGTAGGAGGAGAAG  
ATGCAACGGTGCAAAGCCCAACTCCAGTGGCTGAAATTTCTGTTGCTTCTATTGACGCTCAATTTGGGTGATGCCCCG  
15 TGATGCGCGTGAGATGCTGCGGCGCAATTAAGCAAGGCTCAAAGTCAATTGGATGCAACAACCTGTTCTCAGTACC  
CTAGAGGGAAGTGTGGTGAAGTCAATAGCAATGTTTCTAAATCTCCAACAGGGGCGAGTCAAGTTATGGTTCATA  
TTGTCAGCAATGAAAAATTTACAAGTCAAGGGAGAATTGTCTGAGTACAATCTAGCCAACCTTTCTGTAGGTCAAGA  
AGTAAGCTTTACTTCTAAAGTGTATCCTGATAAAAAAATGGACTGGGAAATTAAGCTATATTCTGACTATCCTAAA  
AACAATGGTGAAGCAGCTAGTCCAGCAGCCGGGAATAATACAGGTTCTAAATACCTTTATACTATTGATGTGACAG  
GCGAGGTTGGTGATTTGAAACAAGGTTTTTCTGTCAACATTGAGGTTAAAAGCAAAAAGCTAAGGCTATTCTGTTCCT  
20 GTTAGCAGTCTAGTAATGGATGATAGTAAAAATTATGTCTGGATTGTGGATGAACAACAAAAAGGCTAAAAAAGTT  
GAGGTTTCATTGGGAAATGTGACGCAGAAAAATCAAGAAATCACTTCTGGTTTAACGAACCGTGCTAAGGTCATCA  
GTAATCCAACATCTTCTTGAAGAAAGGAAAAAGAGGTGAAGGCTGATGAAGCAACTAATTAG

(SEQ ID NO: 94)

20 MKKKNGKAKKWQLYAAIGAASVVVLGAGGILLFRQPSQTALKDEPTHLVVAKEGSVASSVLLSGTVTAKNEQYVYFD  
ASKGDLDELIVSVGDKVSEGOALVKYSSSEAQAAYDSASRAVARADRHINELNQARNEAASAPAPQLPAPVGGEDATV  
QSPTPVAGNSVASIDAQLGDARDARADAAAQLSKAQSLDATTVLSTLEGTVEVNSNVSKSPTGASQVMVHIVSNEN  
LQVKGELSEYNLANLSVGQEVSFSTKVYPDKKWTGKLSYISDYPKNNGEAASPAAGNNTGSKYPYIDVTGEVGDLLKQ  
25 GFSVNIEVKSKTKAILVPVSSLVMDSDSKNYVWIVDEQQKAKKKEVSLGNADAENQEITSGLTNGAKVISNPTSSLEEGKE  
VKADEATN

**ID50 759bp**

(SEQ ID NO: 95)

30 ATGTCACGTAAACCATTTATCGTGGTAACTGGAAAATGAACAAAAATCCAGAAGAAGCTAAAGCATTCGTTGAA  
GCAGTTGCATCAAAAACCTTCTTCATCAGATCTTGTGAAGCAGGTATCGCTGCTCCAGCTCTTGATTGACAACCTGT  
TCTTGCTGTTGCAAAAGGCTCAAACCTTAAAGTTGCTGCTCAAAAACCTGCTACTTTGAAAATGCAGGTGCTTTCACTG  
GTGAACTAGCCCAACAAGTTTGAAGAAATCGGTACTGACTACGTTGTTATCGGTCACTCAGAACGCCGTGACTA  
35 CTTCCATGAAACTGATGAAGATATCAACAAAAAAGCAAAAAGCAATCTTTGCGAACGGTATGCTTCCAATCATCTGT  
TGTGGTGAATCACTTGAACCTTACGAAGCTGGTAAAGCTGCTGAATTCGTAGGTGCTCAAGTATCTGCTGCATTGG  
CTGGATTGACTGCTGAACAAGTTGCTGCCTCAGTTATCGCTTATGAGCCAACTCTGGGCTATCGGTACTGGTAAATCA  
GCTTACAAGACGATGCACAAAAAATGTGTAAGTTGTTCTGACGTTGTAGCTGCTGACTTTGGTCAAGAAAGTCG  
CAGACAAAGTTCTGTTCAATACGGTGGTTCTGTTAAACCTGAAAATGTTGCTTCATACATGGCTTGCCAGACGTT  
40 GACGGTGCCCTTGATAGGTGGTGCCTCACTTGAAGCTGAAAGCTTCTTGGCTTGCTTGACTTTGTAAAAATAA

(SEQ ID NO: 96)

45 MSRKPFIAGNWKMKNPPEAKAFVEAVASKLPSSDLVEAGIAAPALDLTTVLAVAKGSNLKVAAQNCYFENAGAFTGE  
TSPQVLKEIGTDYVVIHGSERRDYFHETDEDINKKAKAIFANGMLPIICCGESLETYEAGKAEFVGAQVSAALAGLTAE  
QVAASVIAEPIWAIGTKSASQDDAQKMKCVVRDVVAADFGQEVADKVRVQYGGSVKPNVASYMACPDVDGALV  
GGASLEAESFLALLDFVK

**ID51 1473bp**

(SEQ ID NO: 97)

50 TTGAAAACAAAAATTGGATTAGCAAGTATCTGTTTACTAGGCTTGGCAACTAGTCATGTCGCTGCAAAATGAACTG  
AAGTAGCAAAAACCTTCGAGGATACAACGACAGCTTCAAGTAGTTCAGAGCAAAAATCAGTCTTCTAATAAAACGC  
AAACGAGCGCAGAAGTACAGACTAATGCTGCTGCCCACTGGGATGGGGATTATTATGTAAAGGATGATGGTTCTA  
AAGCTCAAAGTGAATGGAATTTTGAACAACCTACTATAAGGCTTGGTTTTATTAATTCAGATGGTGGTACTCGCAG  
AATGAATGGCATGGAAATTACTACCTGAAATCAGGTGGATATATGGCCCAAAACGAGTGGATCTATGACAGTAATT  
55 ACAAGAGTTGGTTTTATCTCAAGTCAGATGGGGCTTATGCTCATCAAGAATGGCAATTGATTGGAAAATAAGTGGA  
CTACTTCAAGAAGTGGGGTTACATGGCTAAAAGCCAATGGCAAGGAAGTTATTTCTTGAATGGTCAAGGAGCTATG  
ATGCAAAAATGAATGGCTCTATGATCCAGCCTATTCTGCTTATTTTATCTAAAAATCCGATGGAACCTTATGCTAACCA  
AGAGTGGCAAAAAGTGGGCGGCAAAATGCTACTATTCAAGAAGTGGGGCTATATGGCTCGGAATGAGTGGAAGG  
60 CAACTACTATTGACTGGAAGTGGTGCCATGGCGACTGACGAAGTGATTATGGATGGTACTCGCTATATCTTTGCG  
GCCTCTGGTGAGCTCAAAGAAAAAAGATTGAAATGTCGGCTGGGTTACAGAGATGGTAAGCGCTATTTCTTTA  
ATAATAGAGAAGAACAAGTGGGAACCGAACATGCTAAGAAAGTCATTGATATTAGTGAGCACAATGGTTCGTATCA  
ATGATTGGAAAAAGGTTATTGATGAGAACGAAGTGATGGTGTCAATTGTTCTAGGTTATAGCGGTAAAGAAGA  
CAAGGAATTGGCGCATAACTTAAGGAGTTAAACCGTCTGGGAATTCTTATGGTGTCTATCTCTATACCTATGCTG  
65 AAAATGAGACCGTGCTGAGAGTGACGCTAAACAGACCATTGAACCTATAAAGAAATACAATATGAACCTGTCTTA  
CCCTATCTATTATGATGTTGAGAATTGGGAATATGTAAATAAGAGCAAGAGAGCTCCAAGTGATACAGGCACCTGG  
GTTAAATCATCAACAAGTACATGGACACGATGAAGCAGGCGGTTATCAAAATGTGTATGTCTATAGCTATCGTA

GTTTATTACAGACGCGTTTAAAACACCCAGATATTTTAAACATGTAACTGGGTAGCGGCCTATACGAATGCTTT  
AGAATGGGAAAACCTCATTATTACAGGAAAAAAGGTTGGCAATATACCTCTTCTGAATACATGAAAGGAATCCA  
AGGGCGCGTAGATGTCAGCGTTTGGTATTA

5 (SEQ ID NO: 98)  
MKTIGLASICLLGLATSHVAANETEVAKTSQDTTTTASSSEQNQSSNKTQTSAEVQTNAAHWDGDYVVKDDGSKAQ  
SEWIFDNYYKAWFYINSDGRYSQNEWHGNYLKSGGYMAQNEWIYDSNYKSWFYLKSDGAYAHQEWQLIGNKWYY  
FKKWGYMAKSQWQGSYFLNGQGAMMQNEWLYDPAYSAFYFLKSDGTYANQEWQKVGGKWYYFKKWGYMARNE  
10 WQGNYYLTGSGAMATDEVIMDGTRYIFAASGELKEKKDLNVGVVHRDGRYFFNNREEQVTEHAKKVIDISEHNGR  
INDWKKVIDENEVDGVIVRLGYSGKEDKELAHNIKELNRLGIPYGVYLYTYAENETDAESDAKQTIELIKKYNMNLSPYI  
YYDVENWEYVNNKSKRAPSDTGTWVKIINKYMDTMKQAGYQNVYVYSYRSLQTRLKHPDILKHVNWVAAITNALE  
WENPHYSGKKGWQYTSSEYMKGIQGRVDVSVWY

#### **ID52 774bp**

15 (SEQ ID NO: 99)  
ATGAAAAAATTTGCCAACCTTTATCTGGGACTGGTCTTTCTGGTCTCTACCTGCCTATCTTTTACTTGATTGGCTAT  
GCCTTTAATGCTGGTGATGATATGAATAGCTTTACAGGTTTTAGCTGGACTCACTTTGAAACCATGTTTGGAGATGG  
20 GAGACTCATGCTGATTTTGGCTCAGACATTTTCTGGCCTTCTATCAGCCTTGATAGCGACCATATCGGGACTTT  
TGGTGCCATTTACATCTACCACTCGTAAGAAATACCAAGAACGCTTTCTATCACTCAATAATATCCTCATGGTTG  
CGCCTGACGTTATGATTGGTGTAGCTTCTTGATTCTCTTTACCCAACCTCAAGTTTCACTTGGCTTTTGACCGTTC  
TATCTAGTCACGTGGCCTTCTCCATTCCTATCGTGGTCTTGATGGTCTTGCCTCGACTCAAGGAAATGAATGGCGAC  
ATGATTCATGCGGCCTATGACTTGGGAGCTAGTCAATTTACAGATGTTCAAGGAAATCATGCTTCCTTACCTGACTCC  
25 GTCTATCATTACTGGTTATTTTATGGCCTTCACCTATTCGTTAGATGACTTTGCCGTGACCTTCTTTGTAACAGGAAA  
TGGCTTTTCAACCTATCAGTCGAGATTTACTCTCGTGCTCGCAAGGGGATTTCTTAGAAATCAATGCCCTGTCTG  
CTCTAGTCTTTCTTTAGTATTATCCTAGTTGTAGGTTATTACTTTATCTCTCGTGAGAAGGAGGAGCAAGCATGA

(SEQ ID NO: 100)  
30 MKKFANLYLGLVFLVLYLPIFYLIGYAFNAGDDMNSFTGFSWTHFETMFGDGRMLLILAQTFFLAFLSALIATIGTFGAI  
YIYQSRKKYQEAFLSLNNILMVAPDVMIGASFLILFTQLKFSLGFLTVLSSHVAFSIPVVLMLVPLRLKEMNGDMIHAAAYD  
LGASQFQMFKEIMLPYLTPTSITGYMAFTYSLDDFAVTFVTGNFSTLSVEIYSRARKGISLEINALVFLFSIILVVG  
YYFISREKEEQA

#### **ID59 1071bp**

35 (SEQ ID NO: 101)  
ATGAAAAAATCTATTCTATTTTACGAGGAATTGCAGCGATTATCCTTGTCTTGTGGGAATTGCGACTCATTTAGA  
TAGTAAAAATCAATAGTCGAGATAGTCAAAAAATTGGTTATCTATAACTGGGGAGACTATATCGATCCTGAACCTTTG  
40 ACTCAGTTTACAGAAGAAACAGGAATTCAAGTTCAGTACGAGACTTTTACTCCAACGAAGCCATGTACACTAAGA  
TAAAGCAGGGTGGAACGACCTACGATATTGCCATTCCAAGTGAATACATGATTAACAAGATGAAGGACGAAGACC  
TCTTGGTTCCGCTTGATTATTCAAAAATTGAAGGAATCGAAAAATATCGGACCAGAGTTTCTCAACCAAGTCTTTGAC  
CCAGGTAATAAATTCTCCATCCCTTACTTCTGGGGAACCTTAGGAATTGTCTACAACGAAACCATGGTAGATGAAG  
CGCCTGAGCATTGGGATGACCTTTGGAAAGCCGGAGTATAAGAAATCTATCATGCTCTTTGATGGGGCGCGTGAGGT  
45 GCTGGGACTAGGACTCAATTCCTCGGTACAGCTCAAGTCAAGGATCTGCAGCAGTTTGAAGAGACAGTGGAT  
AAGCTCTACAACTGACTCCAAATATCAAGGCTATCGTTGCGGACGAGATGAAGGGCTATATGATTTCAGAAATATG  
TTGCAATCGGCGTGACCTTCTCTGGTGAAGCCAGCCAAATGTTAGAAAAAAATGAAAATCTACGTTATGTGGTACC  
GACAGAGGCCAGCAATCTTTGGTTTGACAATATGGTCAATCCCAAAACAGTTAAAAACCAAACTCAGCCTATGCC  
TTTATCAACTTTATGTTGAAACCTGAAAATGCTCTCCAAAATGCGGAGTATGTCGGCTATTCAACACCAAACTACC  
50 AGCGAAGGAATTGCTCCAGAGGAAACAAAGGAAGATAAGGCCTTCTATCCCGATGTTGAAACCATGAAACACCT  
AGAAGTTTATGAGAAATTTGACCATAAATGGACAGGGAAATATAGCGACCTTCTCTACAGTTAAAAATGTATCGG  
AAGTAG

(SEQ ID NO: 102)  
55 MKKIYSFLAGIAAHLVLWGIATHLDSKINSRDSQKLVIYNWGDYIDPELLTQFTEETGIQVQYETFDSNEAMYTKIKQGG  
TTYDIAIPSEYMINKMKDELLVPLDYSKIEGNIPEFLNQSFDPGNKFSIPYFWGTLGIVYNETMVDPEHWDLLW  
KPEYKNSIMLFDGAREVLGLGLNSLGYLSNSKDLQLEETVDKLYKLTPNIKAIVADEMKGYMIQNNVAIGVTFSGEAS  
QMLEKNENLRYVVPTEASNLWFDNMVIPKTVKNQNSAYAFINFMLKPENALQNAEYVGYSTPNLPAKELLPEETKEDK  
AFYPDVETMKHLEVYEKFDHKWTGKYSDFLQFKMYRK

#### **ID61 1851bp**

60 (SEQ ID NO: 103)  
ATGAATAAAAAACTAACAGATTATGTGATTGATCTGGTGAAAAATTTAAATAAACAAACAAAGCAGGTTTTCTGGG  
GAATATTTGATATTTTCAGTATGGTGGTTCCATCATTGTATCTTATATTTTATTTTATGGGCTGATTAATCCAGCAC  
65 CTGTTGACTACATTATCTATACGAGTTTGGCCTTCTGTTCTATCAATTGATGATTGGTTTTTGGGGGTTGAACGCGA  
GCATTAGTCGTTACAGCAAGATTACGGATTCATGAAAATCTTTTTGGTGTGACTGCTAGCAGTGTCTTGTCATAT

AGTATCTGTTATGCCTTCTTGCCACTCTTCTCCATCCGTTTCATCATTCTCTTTATCTTGTTGAGTACCTTCTTGATT  
TATTGCCACGGATTACTTGGCAGTTAATCTACTCCAGACGCAAAAAAGGTAGTGGTGATGGAGAACACCGTCGGAC  
CTTCTTGATTGGTGCCGGTGATGGTGGGGCTCTTTTATGGATAGTTACCAACATCCAACCAAGTGAATTAGAAGTGG  
TCGGTATTTTGGATAAGGATTCTAAGAAAAAGGGTCAAAAACTTGGTGGTATTCCTGTTTGGGGCTCTTATGACAA  
5 CTGCTGAATTAGCCAAACGCCATCAATCGAGCGTGTCATCGTTGCGATTCCGTCGCTGGATCCGTCAGAAATATG  
AGCGTATCTTGCAGATGTGTAATAAGCTGGGTGTCAAATGTTACAAGATGCCTAAGGTTGAAACTGTTGTTTCAGGG  
CCTTCACCAAGCAGGTACTGGCTTCCAAAAAATTGATATTACGGACCTTTTGGGTCGTCAGGAAATCCGCTTGGAC  
GAATCGCGCTCTGGTGCAGAACTGACAGGTAAGACCATCTTAGTCACAGGAGCTGGAGGTTCAATCGGTTCTGAAA  
10 TCTGTCGTCAGGTTAGTCGCTTCAATCCTGAACGCAATGTCTTGGCTCGGTCATGGGGAAAACTCAATCTACCTTGT  
TATCATGAATTGATTTCGTAAGTTCCAAGGGATTGATTATGTACCTGTGATTGCGGACATTCAAGACTATGATCGTT  
GTTGCAAGTCTTTGAGCAGTACAAACCTGCTATTGTTTATCATGCGGCAGCCCAAGCATGTTCTTATGATGGAGC  
GCAATCCAAAAGAAGCCTTCAAAAAACAATATCCGTGGAACCTTACAATGTTGCTAAGGCTGTTGATGAAGCTAAAGT  
GTCTAAGATGGTTATGATTTTCGACAGATAAGGCAGTCAATCCACCAATGTTATGGGAGCAACCAAGCGCTGGCG  
GAGTTGATTGTCACTGGCTTTAACCAACGTAGCCAATCAACCTACTGTGCAGTTCCGTTTTGGGAATGTTCTTGGTAG  
15 CCGTGGTAGTGTCACTTCCAGTCTTTGAACGTCAGATTGCTGAAGGTGGGCTGTAAACGGTGACAGACTTCCGTATG  
ACCGGTTACTTTATGACCATTCAGAAAGCTAGCCGCTCGGTTATCCATGCTGGTGCTTATGCCAAAGATGGGAAAGT  
CTTTATCCTTGATATGGGCAAAACAGTCAAGATTTATGACTTGGCCAAGAAGATGGTGCTTCTAAGTGGCCACACT  
GAAAGTGAATTTCCAATCGTTGAAGTTGGAATCCGCCCAGGTGAAAACTCTACGAAGAAGTCTTGGTATCAACCG  
AATCGTTGATAATCAAGTTATGGATAAGATTTTCGTTGGTAAGGTTAATGTCATGCCTTTAGAATCCATCAATCAA  
20 AAGATTGGAGAGTTCGCACTCTCAGTGGAGATGAGTTGAAGCAAGCTATTATCGCCTTTGCTAATCAAAACAACCC  
ACATTGAATAA

(SEQ ID NO: 104)

MNKKLTIDYVIDLVEILNKQKQVFWGIFDIFSMVVSIIHVSILFYGLINPAPVDYIIYTSIAFLFYQLMIGFWGLNASISRY  
25 KITDFMKIFFGVYASSVLSYSICYAFLPLFSIRFIILFILLSTFLILLPRITWQLIYSRRKKGSGDGEHRRFTLIGAGDGGALFM  
DSYQHPTELELVGILDKDSKKKGQKLGIPVLSYDNLPELAKRHQIERVIVAIPSLDPSEYERILQMCNKLGVKCYKM  
PKVETVVQGLHQAGTGFKIDITDLLGRQEIRLDESRLGAELTGKTLVTGAGGSIGSEICRQVSRFNPRIVLLHGENSI  
YLVYHELIRKFQIDYVPVIADIDYDRLLQVFEQYKPAIVYHAAAHKHVPMERNPKEAFKNNIRGTYNVAKAVDEA  
KYSKVMVMISTDKAVNPPNVMGATKRV AELIVTGFNRQSSTYCAVRFGNVLGSRGSVIPVFERQIAEGGPVTVTDFRMT  
30 RYFMTIPEASRLVIHAGAYAKDGEVFILDMGKPVKIDYDLAKKMVLLSGHTESEIPIVEVGIRPGEKLYEELLVSTELVDNQ  
VMDKIFVGKVNVMPLSINQKIGEFRTLSDGLKQAIIFANQTTHIE

#### **ID101 1338bp**

(SEQ ID NO: 105)

ATGATTGAACCTTATGATAGTTACAGTCAAGAAAGTCGAGATTTACATGAAAGTCTAGTCGCTACTGGTCTTTCTCA  
ACTTGAGTGGTCAATCGATGCAGATGGTTTCTGCCTGATGGTCTGCTTCTCCTTTTACCTATTATCTAGGTTACGA  
GGATGGAAAACTCTCTATTTTAAATCAAGTTCCCGTTTCAGATTTTGGGAAATTTTGGGAGATAATCAGTCTGCTT  
GTATTGAAGATGTGACGCGAGGAGAGGGCTGTCAATTCAATTATGCTGATGGAATGCAGGCTCGCTTGGTTAAACAGGT  
40 AGACTGGAAAGACCTAGAAGGTCGAGTACGTCAGGTTGACCACTACAATCGCTTCGGAGCTTGTCTTGTACAAACG  
ACTTATAGCGCAGATAGCGAGCCGATTATGACAGTTTACCAAGATGTCAATGGTCAACAAGTTTACTGGAAAAACC  
ATGTGACGGGTGATATCTTATTGACTTTGCCAGGTCACTCCATGCGTTACTTTGCAAATAAAGTTGAATTTATCACC  
TTCTTTTCAAGATTTGGAAATAGATACCACTGAGTCTTCTTAAATACTCTAGCGACTCCTTTCTTGGTTTCTCTTC  
CATCATTCAGATAAATCTGGCTCGGATGTCTGGTATGGCAGGAACCTCTCTATGATGCCATTCCAGGTAATATGCA  
45 GTTGATTTTGGAAAGTGATAATGTGCGTACTAAGAAGATCATTCATTCCAAATAAGGCGACTTATGAGCGCGCTT  
GAGTTAACTGACGAGAAATACCATGATCAGTTTGTGCACCTGGGTTATCATTACCAAGTTCAAACGTGATAATTCCT  
AAGACGAGATGCCTTAATCTTGACCAATTCAGATCAGATTGAGCAAGTAGAAGCAATCGCAGGAGCCTTGCTGAT  
GTCACCTTCCGATTGCGAGCGGTGACAGAGATGCTTCTAAGCTCTTAGACATGCTTTGCTATCCTAATGTGGCCCT  
TTACCAGAACGCTAGTCCACAGAAGATTCAGGAGCTGTATCAACTGTCGGATATTTACTTGGATATAAACCACAGT  
50 AATGAGTTGCTACAGCGAGTGCCTCAGGCTTTGAGCACAATCTCTTGAATCTTGGCTTTAATCAGACCGGTGCACA  
ATAGACTTTATATCGCTCCAGACCATCTATTTGAAAGTAGTGAAGTTGCTGCTTTGGTTGAGACCATTAAATTTGGCC  
CTTTCAGATGTTGATCAAAATGCGTCAGGCATCTGGCAAACAAGGCCAACATGCAAAATTATGTTGACTTGGTGAGAT  
ATCAGGAAACCATGCAAACTGTTTTAGGAGGCTAA

(SEQ ID NO: 106)

MIELYDSYSQESRDLHESLVATGLSQLGVVIDADGFLPDGLLSPFTYYLGYEDGKPLYFNQVPVSDFWELGDNQSACIE  
DVTQERAVIHYADGMQARLVKQVDWKDLEGRVRQVDHYNRFACFATTTYSADSEPIMTVYQDVNGQQVLLNHVT  
GDILLTPGQSMRYFANKVEFITFFLQDLEIDTSQLIFNTLATPFLVSFHHDPKSGSDVLVWQEPLYDAIPGNMQLILESDN  
VRTKKIIPNKATYERALELTDEKYHDQFVHLGYHYQFQRDNFLRRDALILTNSDQIEQVEAIGALPDVTFRIAAVTEMS  
60 SKLLDMLCYPNVALYQNASPQKIQELYQLSDIYLDINHSNELLQAVRQAFEHNLLILGFNQTVHNRLYIAPDHLFESSEV  
AALVETIKLALSDVDQMRQALGKQGGHANYVDLVRYQETMQTVLGG

#### **ID102 1512bp**

(SEQ ID NO: 107)

5 ATGACAATTTACAATATAAATTTAGGAATTGGTTGGGCTAGTAGCGGTGTTGAATACGCTCAAGCCTATCGTGCTG  
 GTGTTTTTCGGAAATTAATCTGTCCTCTAAGTTTATCTTTACAGATATGATTTTAGCCGATAATATTCAGCACTTAA  
 CAGCCAATATTGGTTTTGATGATAATCAGGTTATCTGGCTTTATAATCATTTTCACAGATATCAAAATTCACCTACT  
 AGCGTGACAGTGGATGATGCTTTGGCTTACTTTGGTGGTGAAGAAAGTCACAGAGAAAAAATGGCAAGGTTTTAC  
 10 GTGTATTTCTTTTTGACCAAGATAAGTTTGTAACTGTTATTTGGTTGATGAGAACAAAGGACTTGGTTCAACATGCC  
 GAGTATGTTTTAAGGGAAACCTGATTCGGAAGGATTACTTTTCTTATACGCGTTATTGTAGCGAGTATTTTGCTCC  
 CAAGGACAATGTTGCAGTCTTATACCAACGAACCTTTTATAATGAAGACGGGACTCCAGTCTATGATATCTTGATG  
 AATCAAGGGAAGGAAGAAGTTTATCATTTCAAGGATAAGATTTTCTATGGAAGCAAGCTTTTGTGCGTGCCTTTA  
 TGAATCTTTGAATTTGAATAAGTCTGATTTGGTCATTCTCGATAGGGAGACAGGTATTGGACAGGTTGTGTTTGAG  
 15 GAAGCACAGACAGCACATCTAGCGGTAGTTGTTTCATGCGGAGCATTATAGTGAATATGCTACAAATGAGGACTAT  
 ATCCTTTGGAATAACTATTATGACTATCAGTTTACCAATGCAGATAAGGTTGACTTCTTTATCGTGTCTACTGATAG  
 ACAAATGAAGTTCTACAAGAGCAATTTGCCAAATATACTCAGCATCAGCCAAAGATTGTTACCATTCCTGTAGGC  
 AGTATTGATTCTTGACAGATTCAAGTCAAGGGCGCAAACCATTTTTCATTGATTACGGCTTCACGTCTTGCCAAAGA  
 AAAGCACATTGATTGGCTTGTGAAAGCTGTGATTGAAGCTCATAAGGAGTTACCGGAACTAACCTTTGATATCTAT  
 20 GGTAGTGGTGGAGAAGATTCTCTGCTTAGAGAAATTATTGCAAAATCATCAGGCAGAGGACTATATCCAATCAAGG  
 GGCATGCGGAACCTTCGAGATTATAGCCAGTATGAGGTCTACTTAACGGCTTCTACCAGCGAAGGATTGTTGGTCT  
 GACCTTGATGGAAGCTATTGGTTCAGGTCTACCTCTAATTGGTTTTGATGTGCCTTATGGTAATCAGACCTTTATAG  
 AGGATGGGCAAAATGGTTATTTGATTCCAAGTTCATCTGACCATGTAGAAGACCAAAATCAAGCAAGCTTATGCCGC  
 TAAGATTTGTCAATTGTATCAAGAAAATCGTTTGGGAAGCTATGCGTGCCTATTCTTACCAAAATGCAGAAGGCTTCT  
 25 TGACCAAGAAAATTTTAGAAAAGTGAAGAAAACAGTAGAGGAGGTGCTCCATGATTGA

(SEQ ID NO: 108)

25 MTIYNINLIGWASSGVEYAQAYRAGVFRKLNLSKFIFDMLADNIQHLTANIGFDDNQVIWLYNHFTDIKIAPTSVTV  
 DDVLAIFYGGEESHREKNGKVLRFVFFDQDKFVTCYLVDENKDLVQHAIFYFKGNLIRKDYFSYTRYCSEYFAPKDNVA  
 30 VLYQRTFYNEDGTPVYDILMNQKKEEVYHFKDKIFYGKQAFVRAFMSLNLNKSDDLVDRETGIGQVVFEEAQTALH  
 ARVVVHAEHYSENATNEDYILWNNYYDYQFTNADKVDFFIVSTDQRNEVLQEQFAKYTQHPKIVTIPVGSIDSLTDSSQ  
 GKKPFLITASRLAKEKHIDWLKAVIEAHKELPELTFDIYSGSGEDSLLREIHANHQAEIDYIQLKGHAELSQIYSQYEVYL  
 35 TASTSEGFLTLMEAIIGSLPLIGFDVPYGNQTFIEDGQNGYLIPISSSDHVEDQIKQAYAAKICQLYQENRLEAMRAYSY  
 QIAEGFLTKEILEKWKKTVEEVLHD

#### **ID103 2292bp**

(SEQ ID NO: 109)

35 ATGTCCTCTCTTTCCGGATCAAGAATTAGTAGCTAAAACAGTAGAGTTTCGTCAGCGTCTTTCCGAGGGAGAAAGTC  
 TAGACGATATTTTGGTTGAAGCTTTTGTCTGTGGTGCCTGAAGCAGATAAGCGGATTTTAGGGATGTTTCCTTATGAT  
 GTTCAAGTCATGGGAGCTATTGTCTATGCACTATGGAATGTTTGTCTGAGATGAATACCGGGGAAGGTAAGACCTTGA  
 40 CAGCTACCATGCCTGTCTATTGAAACGCTTTTTCAGGAGAAGGAGTGATGGTTGTGACTCCTAATGAGTATTTATCA  
 AAGCGTGATGCCGAGGAAATGGGTCAAGTTTATCGTTTCTAGGATTGACCATTGGTGTACCATTACCGGAAGATC  
 CAAAGAAGGAGATGAAAGCTGAAGAAAAGAAGCTTATCTATGCTTCGGATATCATCTACACAACCAATAGTAATT  
 TAGGTTTTGATTATCTAAATGATAACCTAGCCTCGAATGAAGAAAGGTAAGTTTTACGACCGTTTAACTATGTGATT  
 45 ATTGATGAAATTGATGATATCTTGCTTGATAGTGCACAACTCCTCTGATTATTGCGGGTCTCCTCGTGTTCAGTCT  
 AATTACTATGCGATCATTGATACACTTGTAAACAACCTTGGTCTGAAGGAGAGGATTATATCTTTAAAGAGGAGAAAG  
 AGGAGGTTTGGCTCACTACTAAGGGGGCCAACTGCTGCTGAGAATTCCTAGGGATTGATAATTTATACAAGGAAGA  
 GCGATGCGTCTTTTGTCTCGTCAATTGGTTTTATGCGATTTCGAGCTCATAAGCTCTTTACTAAAGATAAGGACTATATCA  
 50 TTCGTGGAATGAGATGGTACTGGTTGATAAGGGAACAGGGCGTCTAATGGAAATGACTAAACTTCAAGGAGGTC  
 TCCATCAGGCTATTGAAGCCAAGGAACATGTCAAATTATCTCTGAGACGCGGGCTATGGCCTCGATCACCTATCA  
 GAGTCTTTTTAAGATGTTTAATAAGATATCTGGTATGACAGGGACAGGTAAGGTGCGGAAAAAGAGTTTATTGAA  
 ACTTACAATATGTCTGTAGTACGCATTCCAACCAATCGTCCGAGACAACGGATTGACTATCCAGATAATCTATATAT  
 55 CACTTTACCTGAAAAAGTGTATGCATCCTTGGAGTACATCAAGCAATACCATGCTAAGGGAAATCCTTTACTCGTTT  
 TTGTAGGCTCAGTTGAAATGTCTCAACTCTATTCTGCTCTCTTGTTCGTGAAGGATTGCCATAATGTCTCTAAAT  
 GCTAATAATGCGGCGCGTGAGGCTCAGATTATCTCCGAGTCAGGTGAGATGGGGGCTGTGACAGTGGCTACCTCTA  
 TGGCAGGACGTGGTACGGATATCAAGCTTGGTAAAGGAGTCGACAGAGCTTGGGGCTTGATTGTTATTGGGACTGA  
 60 GCGGATGGAAGTCAAGGATCGACCTACAAATTCGTGGCCGTTCTGGTCTGTCAGGGAGATCCTGGTATGAGTAA  
 TTTTTGTATCCTTAGAGGATGATGTTATCAAGAAAATTTGGTCCATCTTGGGTGCATAAAAAGTACAAAGACTATCA  
 GGTTCAAGATATGACTCAACCGGAAGTATTGAAAGGTCGTAAATACCGGAAACTAGTCGAAAAGGCTCAGCATGC  
 CAGTGATAGTGTGACGTTTCAGCACGTCGTGAGTCTGGAAGTATGCTGAAAGTATGAATATACAACGGGATATA  
 65 GTCTATAAAGAGAGAAATCGTCTAATAGATGGTTCTCTGACTTAGAGGATGTTGTTGTGGATATCATTGAGAGAT  
 ATACAGAAGAGGTAGCGGCTGATCACTATGCTAGTCGTGAATTATTGTTTCACTTTATTGTTGACCAATATTAGTTT  
 CATGTTAAAGAGGTTCCAGATTATATAGATGTAAGTACAAAACTGCAGTTTCGTAGCTTTATGAAGCAGGTGATTG  
 ATAAAGAACTTTCTGAAAAGAAAGAAATTACTTAATCAACATGACTTATATGAACAGTTTACGACTTTCATGCTT  
 AAAGCCATTGACAACTGGGTAGAGCAGGTAGACTATCTACAACAGCTATCCATGGCTTCGGTGGTCACTGCTG

(SEQ ID NO: 110)

MSSLSDDQELVAKTVEFRQLSEGESLDDILVEAFVVRREADKRILGMFPYDVQVMGAIVMHYGNVAEMNTGEGKTLTA  
 TMPVYLNAFSGEGVMVVTNPNEYLSKRDAEEMGQVYRFLGLTIGVPFTEDPKKEMKAEEKKLIYASDIYTTNSNLGFDY  
 LNDNLASNEEGKFLRPFNYVIIDEIDDILLDSAQTPLIAGSPRVQSNYYAIIDTLVTTLVEGEDYIFKEEKEEVWLTTKGA  
 KSAENFLGIDNLYKEEHASFAHRLVYAIRAHKLFTKDKDYIIRGNEMVLVDKGTGRLEMTKLQGGHLHQAIEAKEHVK  
 LSPETRAMASITYQSLFKMFNKISGMTGTGKVAEKEFIETYNMSVVRIPTNRPRQRIDYPDNLYITLPEKVYASLEYIKQY  
 HAKGNPLLVFVGSVEMSQLYSSLLFREGIAHNVLNANNAAREAQIIESGQMGAVTVATSMAGRGTDIKLGKGV AELG  
 GLIVIGTERMESQRIDLQIRGRSGRQGDPMGSKFFVSLDDVIKKFGPSWVHKYKDYQVQDMTQPEVLKGRKYRKL  
 EKAQHASDSAGRSARRQTLEYAESMNIQRDIVYKERNRLIDGSRDLEDVVDIERYTEEVAAADHYASRELLFHFIVTNIS  
 FHVKEVPDYIDVTDKTAVRSMKQVIDKELSEKKELLNQHDLYEQFLRLSLLKAIDDNWVEQVDYLLQQLSMAIGGQSA  
 SQKNPIVEYYQEAYAGFEAMKEQIHADMVRNLLMGLVEVTPKGEIVTHFP

**ID104 879bp**

(SEQ ID NO: 111)

ATGAAACAAGAAATGGTTTGAAAGTAATGATTTTGTAAAAACAACAAGCAAGAACAAGCCTGAAGAGCAAGCTCAA  
 GAGGTTGCAGACAAGGCTGAAGAAAGGATACCCGATCTCGATACACCAATTGAAAAAAATACTCAGTTAGAGGAG  
 GAAGTCTCTCAAGCTGAAGTCGAATTGGAAAGCCAGCAAGAAGAGAAAAATTGAAGCTCCTGAAGACAGTGAAGCC  
 AGAACAGAAATAGAAGAAAAGAAGGCATCTAATTCTACTGAAGAAGAGCCAGACCTTTCTAAAGAAACAGAAAA  
 AGTCACTATAGCTGAAGAGAGCCAAAGAAGCTCTTCTCAGCAAAAAGCAACCACGAAAGAGCCACTTCTTATCAG  
 TAAATCTTTAGAAAGTCCTTATATCCCCGACCAAGCTCCAAAATCTAGGGATAAAATGGAAAGAGCAAGTGCTTGAT  
 TTTTGGTCTTGGCTAGTGGAAGCGATCAAAATCTCTACAAGTAAGTTGGAAACAAGTATCACACACAGTTACACAG  
 CCTTTCTTTGCTCATLLILFTGTTTCTGCATCTTCTTTTCTTTTAGTATCTATCACATCAAAACATGCTTACTATGGACA  
 TATAGCAAGCATTAAACAGTCGCTTCCCTGAGCAGCTAGCTCCTTTAACTCTTTTTTCTATCATCTCTATCCTAGTAGC  
 GACAACACTCTTCTTTCTTTTCTTCTTCTTGGGTAGTTTCGTTGTGAGACGATTTATCCACCAGGAAAAAGGACTGGA  
 CGCTAGACAAGGTTCTCCAACAATATAGTCAACTCTTGCAATTCCTCACTGCTATTGCTAGTTTCTTTG  
 CTTTCTTTGATAGCCTACGATTTACAGCCCTCTTGTGTGTGA

(SEQ ID NO: 112)

MKQEWFSNDFVKTTSKNKPEEQAEVADKAEERIPDLDTPIEKNTQLEEEVSQAEVELESQEEKIEAPEDSEARTEIEE  
 KKASNSTEEEPDLKETEKVTIAEESQEALPQKATTKPELLISKSLSPYIPDQAPKSRDKWKEQVLDVFWSWLVEAIKSP  
 TSKLETSITHSYTAFLLILFSASSFFSIYHIKHAYYGHASINSRFEQLAPLTLFSIISILVATTLFFFSFLLGSFVVRRIHQ  
 EKDWTLDKVLQYQSLLAIPISL LLLVSLLSLIAVDLQPSCV

**ID106 327bp**

(SEQ ID NO: 113)

ATGTACTTTCCAACATCCTCTGCCTTGATTGAATTTCTCATCTTGGCTGTACTGGAGCAGGGTGATTCTTATGGTTAT  
 GAGATTAGCCAAACCATTAAGCTGATCGCTAATATCAAAGAATCCACACTCTATCCCATTCTCAAAAAATTGGAAG  
 GCAATAGCTTTCTGACAACCTATTCTAGAGAGTTCCAAGGTGCGATGCGCAAATACTACTCCTTGACAAAACGGTGG  
 TATAGAGCAGCTCTTGACCTAAAAGATGAATGGGCACTCTATACAGACACCATCAATGGCATCATAGAAGGGAG  
 TATCCGCCATGACAAGAACTGA

(SEQ ID NO: 114)

MYFPTSSALIEFLILAVLEQGDSYGYEISQTIKLIANIKESTLYPILKKLEGN SFLT TYSREFQGRMRKYSLTNGGIEQLLT  
 LKDEWALYTDTINGIIEGSIRHDKN

**ID108 954bp**

(SEQ ID NO: 115)

ATGGATTTTGAAAAAATTGAACAAGCTTATATCTATTTACTAGAGAATGTCCAAGTCATCCAAAGTGATTGGCGA  
 CCAACTTTTATGACGCCTTGGTGAGCAAAAATAGCATCTATCTGGATGGTGAAACTGAGCTAAACCAGGTCAAAGA  
 CAACAATCAGGCCCTTAAGCGTTTAGCACTACGCAAGAAGAATGGCTCAAGACCTACCAGTTTCTCTTGATGAAG  
 GCTGGGCAAAACAGAACCCTTGCAAGGCCAATCACCAGTTTACACCGGATGCTATTGCTTTGCTTTTGGTGTTTATTGT  
 GGAAGAGTTGTTTAAAGAGGAGGAAAATTACTATCCTCGAAATGGGTTCTGGGATGGGAATTCTAGGCGCTATTTTC  
 TTGACCTCGCTTACTAAAAAGGTGGATTACTTGGGAATGGAAGTGGATGATTTGCTGATTGATCTGGCAGCTAGCA  
 TGGCAGATGTAATTGGTTTGCAGGCTGGCTTTGTCCAAGGAGATGCCGTTGCGCCACAAAATGCTCAAAGAAAGCGA  
 TGTGGTCATCAGTGACTTGCCTGTGCGCTATTATCCTGATGATGCCGTTGCGTCGCGCCATCAAGTTGCTTCTAGCC  
 AAGAACATACTTACGCCCATCACTTGCTCATGGAACAAGGGCTTAAGTACCTCAAGTCAGACGGATACGCTATTTT  
 TCTAGCTCCGAGTGATTTGTTGACCAGTCTCAAAGTGATTTGTTAAAGAATGGCTGAAAGAAGAGGCGAGTCTG  
 GTTGCTATGATTAGTCTGCCTGAAAAATCTCTTTGCTAATGCCAAACAATCTAAGACTATTTTTATCTTACAGAAGAA  
 AAATGAAATAGCAGTAGAGCCTTTTGTATATCCACTTGCTAGCTTGAAGATGCAAGTGTTTAAATGAAATTTAAAG  
 AAAATTTTCAAAAAATGACTCAAGGTACTGAAATATAA

(SEQ ID NO: 116)

MDFEKIEQAYIYLLLENVQVIQSDLATNFYDALVEQNSIYLDGETELNQVKDNNQALKRLALRKEEWLKYQFLLMKAG  
QTEPLQANHQTTPDAIALLLVFIVEELFKEEITILEMGS GMILGAIFLTS LTKKVDYLGMEVDDLLIDLAASMADVIGL  
QAGFVQGDVVRPQMLKESDVVISDLPVGYYPDDAVASRHQVASSQEHTYAHLLMEQGLKYLKSDGYAIFLAPSDLLT  
SPQSDLLKEWLKEEASLVAMISLPENLFANAKQSKTIFILQKKNEIAVEFPVYPLASLQDASVLMKFENFQKWTQGTETI

# ID110 1902bp

(SEQ ID NO: 117)

ATGATTATTTTACAAGCTAATAAAAATTGAACGTTCTTTTGCAGGAGAGGTTCTTTTCGATAATATCAACCTGCAGGT  
TGATGAACGAGATCGGATTGCTCTTGTGGGAAAAATGGTGCAGGTAAGTCTACTCTTTTGAAGATTTTAGTTGGA  
GAAGAGGAGCCAACTAGCGGAGAAATCAATAAGAAAAAAGATATTTCTCTGTCTTACCTAGCCCAAGATAGCCGT  
TTTGAGTCTGAAAATACCATCTACGATGAAAATGCTTCATGTCTTTAATGATTGCGTCCGACGGAGAGACAACCTGC  
GTCAGATGGAGCTGGAGATGGGTGAAAAGTCTGGTGAGGATTTGGATAAACTGATGTCAGATTATGACCGCTTATC  
TGAGAATTTTCGCCAAGCAGGTGGCTTTACCTATGAAGCTGATATTCGAGCGATTTTGAATGGATTCAAGTTTGACG  
AGTCTATGTGGCAGATGAAAATTTGCTGAGCTTTCTGGTGGTCAAAAATACTCGTTTGGCACTTGCCAAAAATGCTCCTT  
GAAAAGCCCAATCTCTTGGTCTTGGACGAGCCAACTAACCACCTTGGATATTGAAACCATCGCCTGGCTAGAGAATT  
ACTTGGTAAACTATAGCGGTGCCCTCATTATCGTCAGCCACGACCGTTATTTCTTGGACAAGGTTGCGACAATTACG  
CTAGATTTGACCAAGCATTCTTGGATCGCTATGTGGGGAATTAATCTCGTTTGTGCGAATTGAAGGAGCAAAAAGCT  
AGTTACTGAGGCAAAAACTATGAAAAGCAACAGAAGGAAATCGCTGCTCTGGAAGACTTTGTCAATCGCAATCT  
AGTTCTGCTTCAACGACTAAACGTGCTCAATCTCGCCGTAACAACTAGAAAAATGGAGCGTTTGGACAAGCCT  
GAACTGGCAAGAAAGCAGCCAACTAGACCTTCCAGTCTGAAAAAACGTCGGGCAATGTTGTTTTGACTGTTGAAA  
ATGCAGCTGTTGGCTATGACGGGGAAGTCTTGTCAACCTATCAACCTAGATCTTCGTAAGATGAATGCTGTCGC  
TATCGTTGGTCCAAATGGTATCGGCAAGTCAACCTTTATCAAGTCTATTGTGGACCAGATTCCCTTTTATCAAGGGAG  
AAAAGCGCTTTGGCGTAATGTTGAGGTTGGTACTATGACCAAAACCCAAAGCAAGCTGACACCAAGTAATACGGT  
GCTGGATGAACCTGGAATGATTTCAAACCTGACACCAGAAAGTTGAAATCCGCAACCGCTTTCGGAGCCTTCTTTTCT  
CAGGAGATGATGTTAAAAATCAGTCGGCATGCTATCTGGTGGCGAAAAAGCTCGTTTGTCTTTAGCTAAATTGTC  
TATGGAAAAACAATACTTTTGGATTCTGGATGAGCCGACCAACCACTTGGATATTGATAGTAAGGAAGTGCTAGAA  
AATGCCTTGATTGACTTTGATGGAACCTTGCTGTTGTGTCAGTCATGATCGTTACTTTATCAATCGTGTGGCAACTCAT  
GTTTTGGAATTGCTGAGAATGGTTCAACTCTCTACCTTGGAGATTACGACTACTATGTTGAGAAGAAAGCAACAG  
CAGAAATGAGTCAGACTGAGGAAGCTTCAACTAGCAATCAAGCAAGGAAGCAAGTCCAGTCAATGACTATCAGG  
CCCAGAAAGAAAGTCAAAAAGAAGTTCGCAAACTCATGCGACAAATCGAAAGTCTAGAAGCTGAAATTGAAGAGC  
TAGAAAGTCAAAGCCAAGCCATTTCTGAACAAATGTTGGAACAAACGATGCCGACAAACTCATGGAATTACAGG  
CTGAGCTGGACAAAATCAGCCATCGTCAGGAAGAAGCTATGCTTGAGTGGGAAGAATTATCAGAGCAGGTGTA

(SEQ ID NO: 118)

MIILQANKIERSFAGEVLFNDINLQVDERDRIALVGKNGAGKSTLLKILVGEEPTSGEINKKKDISLSYLAQDSRFESENT  
IYDEMLHVFNDLRRTERQLRQMELEMGEKSGEDLDKLMDSYDRLESENFRQAGGFTYEADIRAILNGFKFDESMWQMKI  
AELSGGQNTLRALAKMLLEKPNLLVLDEPTNHLDIETIAWLENYLVNYSGALIIVSHDRYFLDKVATITLDTLKHSLDRY  
VGNYSRFVELKEQKLVTEAKNYEKQKKEIAALEDFVNRNLVRASTTKRAQSRKQLEKMERLDKPEAGKKAANMTFQ  
SEKTSNGVVLTVENAAVGYDGEVLSQPINLDRKMNVAIVGPNIGIKSTFIKSIVDQIPFIKGEKRFGANVEVGYDQT  
QSKLTPSNTVLDELWDFKLTPVEIRNRLGAFILFSGDDVKKSVGMLSGGEKARLLKLMSMENNFLILDEPTNHLDDID  
SKEVLENALIDFDGTLFVSHDRYFINRVATHVLELSENGSTLYLGDYDYYVEKKATAEMSQTTEEASTSNQAKEASPVN  
DYQAQKESQKEVRKLMRQIESLEAIEIELESQSQAISEQMLETNDADKLMELQAELDKISHRQEEAMLEWEEELSEQV

# ID111 1179bp

(SEQ ID NO: 119)

ATGAATCGCTATGCAGTGCAGTTGATTAGCCGTGGGGCTATCAATAAAATGGGAAATATGCTCTATGATTATGGAA  
ATAGTGTCTGGTTGGCTTCTATGGGACTATAGGACAGACAGTTTTAGGAATGTATCAGATTTCTGAGCTCGTCACA  
TCTATTCTCGTCAATCCCTTTGGCGGAGTTATTTAGACCGTTTTCTCGTCTGAAGATTTTAAATGACCGGCAGATCTT  
GTTTGTGGGATTCTTTGTCTGGCTATTTCTTTCATAAGGAATGATAGCTGGATGATTGGCGCTTTGATTGTTGCTAAC  
ATTGTGCAGGCTATTGCTTTTGCCTTTTCTCGCACAGCCAATAAAGCTATCATAACTGAAGTGGTGGAGAAAAGATG  
AGATTGTGATCTATAATTCTCGCTTAGAGCTGGTTTTCAGGTTGTAGGTGTTAGCTCTCCTGTTCTTTCTCTCTCTG  
TTTTACAGTTTGAAGTCTCCATATGACGCTACTGCTAGACTCGCTGACTTTTTTCATTGCTTTTGTCTAGTGGCTT  
TCCTTCCAAAAGAGGAAAGCAAAAAGTTCAAGAGAAAAAGGCTTTTACTGGGAGAGATATTTTGTAGATATCAAGG  
ATGGGTTACACTATATCTGGCATCAGCAAGAAAATTTCTTCTTTTGTCTGGTAGCTTCCAGCGTTAATTTCTTTTTTG  
CAGCTTTTGAATTTCTACTTCCCTTTTTCGAATCAGCTTTACGGGTGAGAAGGAGCCTATGCAAGTATTTTAACTATG  
GGGCTATTGGTTCCATCATTGGGGCTCTTCTAGCTAGTAAAAATTAAGCTAATATTTATAATCTTTGATTTTACTG  
GCTTTGACAGGTTGCGGAGTTTTATGATGGGATTACCACTTCCAACCTTTCTTTCTTTTCTGGAAAAATTTAGTTTGT  
GAATTGTTTATGACGATTTTTAATATTCATTTTTTACTCAAGTACAAACCAAGGTTGAGAGCGAATTTCTTGGAAAG  
AGTACTGAGTACAATTTTTACCTTAGCTATTCTATTTATGCCTATTGCAAAAAGGATTTATGACAGTCTTGCCAAAGTG  
TCCATCTTTATCTTTCTTCTGATTATTGGACTTGGAGTTGATGCCTTATATTCTTAGCTCTCGGATATGTTCCGAACCT  
ATTTTGA AAAATTGATATAA

(SEQ ID NO: 120)

MNRYAVQLISRGAINKMGNMLYDYGNSVWLASMGITIGQTVLGMYQISELVTSILVNPFGGVISDRFSRRKILMTADLVC  
 GILCLAISFIRNDSWMIGALIVANIVQAI AFASRTANKAIITEVVEKDEIVIYNSRLELVLQVVGVSPLVSLVLFQFASLH  
 MTLILLDSLTFIAFVLVAFLPKEEAKVQEKKAFTGRDIFVDIKDGLHYIWHQOEIFFLLLVASSVNNFFFAAEFFLLPFSNQL  
 YGSEGAYASILTMTGAIGSIIGALLASKIKANIYNLLILLALTGVGVFMMGLPLPTFLSFSGNLVCELFMFTIFNIHFFTVQVQT  
 KVESEFLGRVLSTIFTLAILFMPIAKGFMTVLPVSHLYSFLIIGLVVALYFLALGYVRTHFEKLI

# **ID113 2466bp**

(SEQ ID NO: 121)

ATGCAAAATCAATTAATGAATTAACGAAAAATGCTGGAATTTTCCAGCAAAAAACAAAAAATAAAAAATCA  
 GCTAGACCTGGCAAGAAAGGTTCAAGTACCAAAAAATCTAAACCTTAGATAAGTCAGCCATTTTCCAGCTATTT  
 TACTGAGTATAAAAGCCTTATTTAACTTACTCTTTGTAAGTCTCGGTTTCTAGGAGGAATGTTGGGAGCTGGGATTGCT  
 TTGGGATACGGAGTGGCCTTATTGACAAGGTTCCGGTGCCTCAGACAGAAGAATTGGTGAATCAGGTCAGGAC  
 ATCTCTTCTATTTTCAAGAGATTACCTATTCGGACGGGACGGTGATTGCTTCCATAGAGAGTGATTGTTGCGCACTTC  
 TATCTCATCTGAGCAAAATTCGGAATACTGAAGAAGGCTATCATTTGCGACAGAAGATGAACACTTTAAGAACAT  
 AAGGGTGATGTACCAAGCGCGGTGATTCTGTCGACCTTGGGAAATTTGTAGGTTTGGGTTCTCTAGTGGGGGTT  
 CAACCTTGACCCAGCACTAATTAACAGCAGGTGGTTGGGATGCGCCGACCTTGGCTCGTAAGCGCGCAGAGA  
 TTGTGGATGCTCTTGCCTTGAACCGGCCATGAATAAAGATGAGATTTTAACGACCTATCTCAATGTGGCTCCCTTT  
 GGCCGAAATAATAAGGACAGAATATTGCAGGGGCTCGGCAAGCAGCTGAGGGAATTTTCCGTTGATAGTGCCAGT  
 CAGTTGACTGTTCTCAAGCAGCATTTTACGAGGACTTCCACAGAGTCCATTACTCTCCTTATGAAAAATAC  
 TGGGGAGTTGAAGAGTGATGAAGACCTAGAAATTTGGCTTAAGACGGGCTAAGGCAGTTCTTTACAGTATGTATCGT  
 ACAGGTGCATTAAGCAAAGACGAGTATTCTCAGTACAAGGATTATGACCTTAAACAGGACTTTTACCATCGGGCA  
 CGGTTACAGGAATTCACGAGACTATTATACTTTACAACCTTTGGCAGAAGCTCAAGAACGTAATGTATGACTATCTA  
 GCTCAGAGAGACAATGTCTCCGCTAAGGAGTTGAAAAATGAGGCAACTCAGAAGTTTATCGAGATTGGCAGCC  
 AAGGAAATTTGAAAAATGGTGGTTATAAGATTACTACTACCATAGATCAGAAAAATTCATTCTGCCATGCAAAGTGGCG  
 TTGCTGATTATGGCTATCTTTAGACGATGGAACAGGTGCTGTAGAAAGTAGGGAATGTCTTGATGGATAACCAAAC  
 AGGTGCTATTCTAGGCTTTGTAGGTGGTCGTAATTACAAGAAATCAAAATAATCATGCCTTTGATACCAAACGTT  
 CGCCAGCTTCTACTACCAAGCCCTTGCTGGCCTACGGTATTGCTATTGACCAAGGCTTGATGGGAAGTGAACACGAT  
 TCTATCTAACTATCCAACAACTTTGCTAATGGCAATCCGATTATGTATGCTAATAGCAAGGGAACAGGAATGATG  
 ACCTTGGGAGAAGCTCTGAACATTCATGGAATATCCCTGCTTACTGGACCTATCGTATGCTCCGTGAAAAGGGTG  
 TTGATGTCAAGGGTTATATGGAAAAGATGGGTTACGAGATTCTGAGTACGGTATTGAGAGCTTGCCCAATGGGTG  
 TGGTATTGAAGTCACAGTTGCCAGCATACCAATGGCTATCAGACCTTAGCTAATAATGGAGTTTATCATCAGAAG  
 CATGTGATTTCAAAGATTGAAGCAGCAGATGGTAGAGTGGTGTATGAGTATCAGGATAAACCAGTTCAAGTCTATT  
 CAAAAGCTACTGCGACGATTATGCGAGGATTGCTACGAGAAGTTCTATCTCTCGTGTGACAACAACCTTCAAGTC  
 TAACCTGACTTCTTTAAATCCTACTCTGGCTAATGCAGATTGGATTGGGAAGACTGGTACAACCAACCAAGACGAA  
 AATATGTGGCTCATGCTTTGACACCTAGATTAAACCTAGGTGGCTGGATTGGGCATGATGATAATCATTATTGTC  
 ACGTAGAGCAGTTATTCTAATAACTCTAATTACATGGCTCATCTGGTAAATGCGATTACAGGATTTCCCAAGC  
 ATTTGGGGGAACGAGCGCTTTGCTTTAGATCCTAGTGTAGTGAATCGGAAGTCTTGAAATCAACAGGTCAAAAAAC  
 CAGAGAAGGTTTCTGTTGAAGGAAAAGAAGTAGAGGTACAGGTTGCGACTGTTACCAGCTATTGGGCTAATAAGTC  
 AGGAGCGCCAGCGACAAGTTATCGCTTTGCTATTGGCGGAAGTGATGCGGATTATCAGAATGCTTGGTCTAGTATT  
 GTGGGAGTCTACCAACTCCATCCAGCTCAGCAGTTCAAGTAGTAGTCTAGCGATAGCAGTAACCTCAAGTACTA  
 CACGACCTTCTTCTCAAGGGCGAGACGATAA

(SEQ ID NO: 122)

MQNQLNELKRKMLEFFQKQKNKKSARPGKKSSTKSKTLDKSAIFPAILLISIKALFNLLFVLGFLGGMGLGAGIALGY  
 GVALFDKVRVPQTEELVNQVKDISSISEITYSDGTVIASIESDLLRTSISSEIENLKKAIATEDEHFKEHKGVVPKAVIRA  
 TLGKFVGLGSSSGSTLTQQLIKQVVGDAPTLARKAAEIVDALALERAMNKDEILTYLNVAPFGRNNKGQNIAGARQ  
 AAEGIFGVDSQLTVPQAAFLAGLPQSPITYSPYENTGELKSEDELEIGLRRKAVLYSMYRTGALSKEDEYSQYKDYDL  
 KQDFLPSGTVTGISRDYLYFTLLAEAQERMYDYLAQRDNVSAKELKNEATQKPYRDLAAKEIENGGYKITTTIDQKIH  
 AMQSAVADYGYLLDDGTGRVEGVNVLMDNQTGAILGFVGGGRNYQENQNNHAFDTRKSPASTTKPLLAYGIAIDQGLM  
 GSETILSNYPNTFANGNPIMYANSKGTGMMTLGEALNYSWNIPAYWYRMLREKGVVDKGYMEKMGYEIPEYGIESLP  
 MGGGIEVTVAQHTNGYQTLANNVYHQQHVISKIEAADGRVVEYQDKPVQVYSKATATIMQGLLREVLSRVTTTFK  
 SNLTSNLPTLANADWIGKTGTTNQDENMWLMLSTPRLLTGGWIGHDDNHSLSRRAGYSNNSNYMAHLVNAIQQASPSI  
 WGNERFALDPSVVKSEVLKSTGQKPEKVSVEGKEVEVTGSTVTSYWANKSGAPATSYRFAIGGSDADYQNAWSSIVGS  
 LPTPSSSSSSSSSSSSSSSTTRPSSSRARR

# **ID114 1974bp**

(SEQ ID NO: 123)

ATGAAAAATTTTATGTAAGTCCAATTTTCTATTCTAGTAGGATTGATTGCGTTTGGAGTCTTATCCACTTTTCATT  
 ATTTTGTGTAATAATAATCTGTTGACGGTTTAAATTTTGTCTTTTGTAGGAGGCTATGTTTTTTTATTAAGAAAC  
 TGAGAGTGCAATTATACAAGGAGTGATGTAGAACAGATACAGTATGTAACCAACCAAGCGGAAGAAAGTTTGACAG  
 CTCTATTGGAACAGATGCTGTAGGTGTTATGAAATTTGATTTATCTTCTGGAGAGGTTGAGTGGTTTATCCCTAT  
 GCTGAATTGATTTGACCAAGGAAGATGGTGATTTTGATTTAGAAGCTGTTCAAACGATTATCAAGGCTTCAGTAG  
 GAAATCCGTCTACTTATGCCAAGCTTGGTGAGAAAGCGTTATGCTGTTCATATGGATGCTTCTCCGTTGTTTGTAT  
 TTTGTAGATGTATCCAGGGAACAAGCCATAACAGATGAATTGGTAACAAGTAGACCAGTGATTGGGATTGTCTCTG

TGGATAATTATGATGATTTGGAGGATGAAACTTCTGAGTCAGATATTAGTCAAATCAATAGTTTGTAGCTAATTTT  
 ATATCAGAGTTTTCAGAAAAACACATGATGTTTTCTCGTCGGGTAAGTATGGATCGATTTTATCTATTTACTGACTA  
 CACGGTGCCTTGAGGGCTTGATGAATGATAAATTTTCTGTTATTGATGCTTTCAGAGAAGAGTCCAAACAGAGACAG  
 TTGCCCTTGACCTTAAGTATGGGATTTTCTTATGGCGATGGAAATCATGATGAGATAGGGAAAGTTGCTTTGCTCAA  
 TTTGAACTTGGCTGAAGTACGTGGTGGCGACCAAGTGGTTGTTAAGGAAAAACGACGAAACGAAAAATCCAGTTTAT  
 TTTGGTGGTGGGTCTGCTGCTTCAATCAAGCGTACACGGACTCGTACGCGCGCTATGATGACAGCTATTTAGATA  
 AGATTCGGAGTGTAGATCAGGTTTTTGTAGTCGGTCACAAAAATTTAGACATGGATGCTTTGGGCTCTGCTGTAGGT  
 ATGCAGTTGTTCCGACCAATGTGATTGAAAAATAGCTATGCTCTTTATGATGAAGAACAAATGTCTCCAGATATTG  
 AACGAGCTGTTTCATTCATAGAAAAAGAAGGAGTTACGAAGTTGTTGTCTGTTAAGGATGCAATGGGGATGGTGAC  
 CAATCGTCTTTGTTGATTCTTGTAGACCAATTCAAAGACAGCCTTAACATTATCAAAAAGAAATTTATGATTTATTTAC  
 CCAAACCAATTGTTATTGACCAACCATAGAAGGGATCAGGATTTTCCAGATAATGCGGTTATTACTTATATCGAAAGT  
 GGTGCAAGTAGTGCCAGTGAGTTGGTAACGGAATTGATTCAGTCCAGAATTCTAAGAAAAATCGTTTGAGTCGTA  
 TGCAAGCAAGTGTCTTGATGGCTGGTATGATGTTGGATACTAAAAATTTACCTCGCGAGTAAGTGTGCGACATT  
 TGATGTTGCTAGCTATCTCAGAACCGCGCGGAAGTGATAGTATTGCTATCCAGGAAATCGCTGCGACAGATTTTGAA  
 GAATATCGTGAGGTCAATGAACCTTATTTACAGGGGCGTAAATAGGTTTCAGATGTAATAAGCAGAGGGCTAAGG  
 ACATGAAATGCTATGATACAGTTGTTATTAGTAAGGCAGCAGATGCCATGTTAGCCATGTCAGGTATTGAAGCGAG  
 TTTTGTCTTGCGAAGAATACACAAGGATTTATCTCTATCTCAGCTCGAAGTCGTAGTAACTGAATGTACAACGGA  
 TTATGGAAGAGTTAGGCGGTGGAGGCCACTTTAATTTGGCAGCAGCTCAAATTAAGATGTAACCTTGTGAGAAGC  
 AGGTGAAAAACTGACAGAAATTTGATTTAAATGAAATGAAGGAAAAGGAGAAAGAAGAATGA

(SEQ ID NO: 124)

MKKFYVSPFIPILVGLIAFGVLSTFIIFVNNLLTVLILFLFVGGYVFLFKKLRVHYTRSDVEQIQYVNHQAEESLTALLEQ  
 MPVGVMLKLNLSSEVEWFNPYAEILITKEDGDFDLEAVQTIKASVGNPSTYAKLGEKRYAVHMDASSGVLYFVDVSR  
 EQAITDELVTSRPVIGIVSDNYDDLEDETSESISQNSFVANFISEFSEKHHMFSRRVSMDFRYLFTDYTVLEGLMNDK  
 FSVIDAFREESKQRQLPLTSLMGFSYGDGNHDEIGKVALLNLNLAEVRGGDQVVKENDETKNPVYFGGGSAAIKRTR  
 TRTRAMMTAISDKIRSVQVQVGVGHKNLMDALGSAVGMQLFASNVIENSIALYDEEQMSPDIERAVSFIEKEGVTKLL  
 SVKDAMGMVTNRSLILVDHSKTALTLSKEFYDLFTQIVIDHRRDQDFPDNAVITYIESGASSASELVTELIQFQNSKK  
 NRLSRMQASVLMAGMMLDTKNFTSRVTSRTFDVASYLRTGSDSIAIQEIAATDFEYREVNELILQGRKLGSVDVIAEA  
 KDMKCYDTVVISKAADAMLAMSGIEASFVLAKNQTQGISARSRSKLNVRIMEELGGGGHFNLAQAQIKDVTLSEAG  
 EKLTEIVLNMKEKEKEE

#### **ID115 663bp**

(SEQ ID NO: 125)

ATGAAGTGTCTGTTATGTGGGCAGACTATGAAGACTGTTTAACTTTTAGTAGTCICTTACTTCTGAGGAATGATGA  
 CTCTTGCTCTTTGTTCAAGTGTGATTCTACTTTTGAAAGAATTTGGGGAAGAGAACTGTCCAAATTTGATGAAAAACAG  
 AGTTGTCAACAAAGTGTCAAGATTGTCAACTTTGGTGTAAAGAGGGAGTTGAAGTCAGTCATAGAGCGATTTTAC  
 TTACAATCAAGCTATGAAGGATTTTTCAGTCGGTATAAGTTTGATGGAGACTTCCTGTTAAGAAAAAGTTTTCGCTT  
 CATTTTAAAGTGAGGAGTTGAAAAAGTACAAAGAGTATCAATTTGTTGTAATCCCTTAAGTCCTGATAGATATGCT  
 AATAGAGGATTTAATCAGGTTGAGGGCTTGGTAGAGGCAGCAGGCTTTGAGTATCTGGATTTATTAGAGAAAAGA  
 AAGAGAGAGAGCTTCTTCTAAAAATCGTTACAGCGCTTGGGGACAGAACTTCCTTTCTTTATTAAAAAGTGGAG  
 TCACTATTCTAAAAAAATCCTACTTATAGATGATATCTATACTACAGGAGCAACTATAAATCGTGTTAAGAACT  
 GTTGGAAGAAGCTGGTGCTAAGGATGTAAAAACATTTCCCTTGTAAGATGA

(SEQ ID NO: 126)

MKLLCGQTMKTVLTFSSLLLRNDDSLCSDCDSTFERIGEENCPCNMKTELSTKCQDCQLWCKEGVEVSHRAIFTYN  
 QAMKDFFSRYKFDGDFLLRKVFASFSEELKKYKEYQFVVIPLSPDRYANRGNQVEGLVEAAGFEYLDLLEKREERAS  
 SSKNRSERLGTLPFFIKSGVTIPKILLIDDIYTTGATINRVKLLLEEAGAKDVKTFLVR

#### **ID116 1299bp**

(SEQ ID NO: 127)

ATGAAAGTAAATTTAGATTATCTCGGTCGTTATTTACTGAGAATGAATTAACAGAAGAAGAACGTCAGTTGGCGG  
 AGAAACTTCCAGCAATGAGAAAGGAGAAGGGGAACTTTTCTGTCAACGCTGTAATAGTACTATTCTAGAAGAAT  
 GGTATTTGCCCATCGGTGCTTACTATTGTGCGAGAGTGCTTGCTGATGAAGCGAGTCAGAAGTGATCAAACTTTATAC  
 TATTTTCCGACAGGAGGATTTTCCAAAGCAAGATGTTCTCAAAATGGCGCGGCCAATTAACCTCTTTTCAAGAGAAGG  
 TGTCAGAGGGATTGCTTCAAGTAGTAGACAAGCAAAAGCCAACCTTAGTTCATGCGGTAAACAGGAGCTGGAAAGA  
 CAGAAATGATTTATCAAGTAGTGGCTAAAGTGATCAATGCGGGTGGTGCAAGTGTGTTGGCTAGTCCTCGCATAGA  
 TGTTTGTGTTGGAGCTGTACAAGCGCTGCAACAGGATTTTCTTCCGGGATAGCTTTGCTACATGGAGAATCGGAAC  
 CTTATTTTCAACACCACTAGTTGTTGCAACAACCCATCAGTTATTGAAGTTTATCAAGCTTTTGATTGCTGATAG  
 TGGATGAAGTAGATGCTTTTCTTATGTTGATAATCCCATGCTTTACCACGCTGTCAAGAATAGTGTAAGGAGAAT  
 GGATTGAGAATCTTTTAAACAGCGACTTCGACCAATGAGTTAGATAAAAAAGGTCCGTTTAGGAGAACTAAAAAGAC  
 TGAATTTACCGAGACGGTTTCATGGAAATCCGTTGATTATTCCAAAACCAATTTGGTTATCGGATTTTAAATCGCTAC  
 TTAGACAAGAATCGTTTGTACCAAAAGTTAAAGTCCTATATTGAGAAGCAGAGAAAGACAGCTTATCCGTTACTCA  
 TTTTGTCTTCAGAAATTAAGAAAGGGGAGCAGTTAGCAGAAATCTTACAGGAGCAATTTCCAAATGAGAAAAATTGG  
 CTTTGTATCTTCTGTAACAGAGGATCGATTAGAGCAAGTACAAGCTTTTCGAGATGGAGAAGTACAATCACTTATC

AGTACGACAATCTTGGAGCGCGGAGTTACCTTCCCTTGTGTGGATGTTTTCTAGTAGAGGCCAATCATCGTTTGT  
TACCAAGTCTAGTTTGATTGAGATTGGTGGACGAGTTGGACGAAGCATGGATAGACCGACAGGAGATTGCTTTTC  
TTCCATGATGGGTAAATGCTTCAATCAAGAAGGCGATTAAGGAAATTCAGATGATGAATAAGGAGGCTGGTCTAT  
GA

(SEQ ID NO: 128)

MKVNLDDLGRFTENELTEERQLAEKLPAMRKEKGKLCQRCNSTILEEWYLPIGAYYCCELLMKRVRSQDQTLYYFP  
QEDFPKQDVLKWRGQLTPFQEKVSEGLLQVVDKQKPTLVHAVTGAGKTEMIYQVVAKVINAGGAVCLASPRIDVCLEL  
YKRLQQDFSCGIALHGESEPYFRTPLVVATTHQLLKIFYQAFDILLIVDEVDAFPYVDNPMPLYHAVKNSVKENGLRIFLT  
ATSTNELDKKVR LGELKRLNLP RRHGNPLIIPKIWLSDFNRYLDKNRLSPKLKSYIEKQRKTAYPLLIFASEIKKGEQLA  
EILQEQFPNEKIGFVSSVTEDRLEQVQAFRDGELTILISTILIRGVTFPCVDVFFVEANHRLFTKSSLIQIGRVGRSMDRP  
TGDLLFFHDGLNASIKKAIKEIQMMNKEAGL

#### **ID117 870bp**

(SEQ ID NO: 129)

ATGCAAAATCAAAAAAGTTTTAAGGGGCAGTCTCCCTATGGCAAGCTGTATCTAGTGCCAACGCCGATTGGCAATC  
TAGATGATATGACTTTTCGTGCTATCCAGACCTTGAAAGAAGTGGACTGGATTGCTGCTGAGGATACGCCGAATAC  
AGGGCTTTTGGCTCAAGCATTTTGACATTTCCACCAAGCAGATCAGTTTTCATGAGCACAATGCCAAGGAAAAAATT  
CCTGATTTGATTGGTTTCTTGAAAGCAGGGCAAAGTATTGCTCAGGTCTCTGATGCCGGTTTGCCTAGCATTTGAGA  
CCCTGGTCATGATTTAGTTAAGGCAGCTATTGAGGAAGAAATGTCAGTTGTGACAGTTCCAGGTGCCTCTGCAGGA  
ATTTCTGCCTTGATTGCCAGTGGTTTAGCGCCACAGCCACATATCTTTACGGTTTTTACCGAGAAAAATCAGGTCA  
GCAGAAGCAATTTTTGGCTTGAAAAAAGATTATCCTGAAACACAGATTTTTATGAATCACCTCATCGTGTAGCA  
GACACGTTGGAAAAATATGTTAGAAGTCTACGGTGACCGCTCCGTTGTCTTGGTCAGGGAATTGACCAAAATCTATG  
AAGAATACCAACGAGGTACTATCTCTGAGTTATTAGAAAGCATTGCTGAAACGCCACTCAAGGGCGAATGTCTTCT  
CATTGTTGAGGGTGCCAGTCAGGGTGTGGAGGAAAAAGGACGAGGAAGACTTGTTCGTAGAAATTCAAACCCGCAT  
CCAGCAAGGTGTGAAGAAAAACCAAGCTATCAAGGAAGTCGCTAAGATTTACCAGTGGAATAAAAGTCAGCTCTA  
CGCTGCCTACCACGACTGGGAAGAAAAACAATAA

(SEQ ID NO: 130)

MQIQKSFKGQSPYGLYLVATPIGNLDDMTFRAIQTLEKVDWIAAEDTRNTGLLLKHFDISTKQISFHEHNAKEKIPDLIG  
FLKAGQSIQVSDAGLPSIDPGHDLVKAIEIEEIAVVTVP GASAGISALIASGLAPQPHIFYGFLPRKSGQQKQFFGLKKD  
YPETQIFYESPHRVADTLENMLEVYGD RSVV L VRELTKIYEYQRG TISELLESIAETPLKGECLLIVEGASQGVEEKDEE  
DLFEIQTIRIQQGVKKNQAIKEVAKIYQWNKSQLYAA YHDWEEKQ

#### **ID118 345bp**

(SEQ ID NO: 131)

ATGATAAAGAAAGGAAAGGGCTGTTTTATGGACAAAAAAGAATTATTTGACGCGCTGGATGATTTTCCCAACAAT  
TATTGGTAACCTTAGCCGATGTGGAAGCCATCAAGAAAAATCTCAAGAGCCTGGTAGAGGAAAAATACAGCTCTTCG  
CTTGGAATAATAGTAAGTTGCGAGAACGCTTGGGTGAGGTGGAAGCAGATGCTCCTGTCAAGGCCAAGCATGTTTCG  
CGAAAGTGTCCGTCGTATTTACCGTGATGGATTTACGATATGTAATGATTTTTATGGACAACGTCGAGAGCAGGAC  
GAAGAATGTATGTTTTGTGACGAGTTGTTATACAGGGAGTAA

(SEQ ID NO: 132)

MIKKGKGC FMDKKELFDALDDFSQQLLVTLADVEAIKKNLKS LVEENTALRL ENSKLRLR LGEVEADAPVKAHVRES  
VRIYRDGFHVCNDFYQRRREQDEECMFCD ELLYRE

#### **ID119 639bp**

(SEQ ID NO: 133)

ATGTCAAAAGGATTTTATGCTCTCTTGGAGGGACCAGAGGGAGCAGGCAAGACCAGTGTTTAGAGGCTCTGCTAC  
CAATTTTAGAGGAAAAAGGAGTAGAGGTGTTGACGACCCGTGAACCTGGCGGAGTCTTGATTGGGGAGAAAGATTC  
GGGAAGTGATTTGGATCCAAGTCACTCAGATGGATGCTAAAAACAGAGCTACTTCTCTATATTGCCAGTCGCAG  
ACAGCATTTGGTGGA AAAAGTTCTTCCAGCCCTTGAAGCTGGCAAGTTGGTCATCATGGATCGTTTTATCGATAGTT  
CTGTTGCCTATCAGGGATTGGTCTGGCTTAGATATTGAAGCCATTGACTGGCTCAATCAGTTTGCAGACAGATGGC  
CTCAAACCCGATTTGACACTCTATTTTGACATCGAGGTGGAAGAAGGGCTGGCTCGTATTGCTGCTAATAGTGACC  
CGAGGTTAATCGTTTGGATTGGAAGGGTTGGACTTGCATAAAAAAGTTCTGCAAGGCTACCTTTCTCTTCTGGAT  
AAAGAGGGAATCGCATTTGTCAAGATTGATGCTCCTTTGGAGCAAGTTGTGGAAACTACCAAGGCTGTCT  
TGTTTGACGGAATGGGCTTGCCAAATGA

(SEQ ID NO: 134)

MSKGLVSLGPEGAGKTSVLEALLPILEEKGVEVLTTREP GGVLIGEKIREVILDPSHTQMDAKTELLYIASRRQHLVE  
KVLPALEAGKLVIMDRFIDSSVAYQGFGRGLDIEAIDWLNQFATDGLKPDLTLYFDIEVEEGLARIAANS DREVNRLDLE  
GLDLHKKVRQGYLSLLDKEGNRIVKIDASLPLEQV VETTKA VLFDMGLAK

**ID120 408bp**

(SEQ ID NO: 135)

5 ATGGTAGAACAAAGAAAATCAATTACCATGAAAGATGTTGCTTTAGAAGCAGGAGTTAGTGTGGAACTGTTTCAC  
 GTGTAATTAATAAGAAAAAGGCATTAAAGAACTTAACCTTTGAAAAAAGTGGAACAAGCGATTAAAACTTTGAATT  
 ACATTCAGATTACTACGCTAGAGGAATGAAAAAAATCGAACAGAAACGATTGCAATCATTGTACCAAGTATCT  
 GGCATCCCTTCTTTTCAGAATTTGCTATGCATGTGGAAAATGAACTCTATAAGAGAAAATAACAAATTAATCTTTATGT  
 TCTATCAATGGTACAAATAGAGAGCAAGACTATCTGGAGATGTTGCGTCATAATAAAGTTGATGGAGTGGTTGCCA  
 10 TTACCTATAGGCCAATTGAACATTACTTGACGTCAGGAATTCCTTTGTTAGTATTGACCGCACATACTCAGAGATT  
 GCCATTCCTTGTGTTTCA

(SEQ ID NO: 136)

15 MVEQRKSITMKDVALEAGVSVGTVSRVINKEKGIKEVTLKKVEQAIKTLNYPDYARGMKKNRTETIAIIVPSIWHPPFS  
 EFAMHVENEVYKRNNKLLCSINGTNREQDYLEMLRHNKVDGVVAITYRPIEHYLTSGIPFVSIDRTYSEIAIPCVS

**ID121 285bp**

(SEQ ID NO: 137)

20 ATGAATATATTTAGAACAAGAATGTTAGTTTAGATAAAACAGAGATGCATAGGCATTGGAAGTTATGGGATTGGA  
 TTTTGGCTGGGTATCGGAGCCATGGTAGGGACAGGCGTCTTTACAATCACAGGTACTGCAGCTGCAACACTTGCTGG  
 CCCAGCCCTAGTGATTTCAATCGTTATTTCTGCCTTGTGTGTGGGATTATCAGCCCTCTTTTTCAGAAATTCGCTC  
 GCGAGTACCCGTACAGGAGGTGCCTATAGTTACCTCTATGCTATCTTAGGAGAATTCCTCGCTGGTTGGCTGGTT  
 GGTTAACCATGATGGAGTTCATGACAGCCATATCAGGCGTAGCTTCGGGTTGGGACGCTTATTTTAA

(SEQ ID NO: 138)

25 MNIFRTKNVSLDKTEMHRHLKLWDLILLGIGAMVGTGVFTITGTAAATLAGPALVISIVISALCVGLSALFFAEFASRVPA  
 TGGAYSILYAILGEFPWLAGWLTMMEFMTAISGVASGWAAFY

**ID124 1311bp**

(SEQ ID NO: 139)

35 ATGAAATCAAGAGTAAAGGAAACGAGTATGGATAAAATTTGTGGTTCAAGGTGGCGATAATCGTCTGGTAGGAAGC  
 GTGACGATCGAGGGAGCAAAAAATGCAGTCTTACCCTTGTGGCAGCGACTATTCTAGCAAGTGAAGGAAAGACC  
 GTCTTGCAGAATGTTCCGATTTTGTGGATGTCTTTATTATGAATCAGGTAGTTGGTGGTTTGAATGCCAAGGTTGA  
 CTTTGTATGAGGAAGCTCATCTTGTCAAGGTGGATGCTACTGGCGACATCACTGAGGAAGCCCCCTTACAAGTATGTC  
 AGCAAGATGCGCGCCTCCATCGTTGTATTAGGGCCAATCCTTGCCCGTGTGGGTTCATGCCAAGGTATCCATGCCAG  
 GTGGTTGTACGATTGGTAGCCGTCCTATTGATCTTCAATTTGAAAGGTCTGGAAGCTATGGGGTTAAGATTAGTCAG  
 ACAGCTGGTTACATCGAAGCCAAGGCAGAACGCTTGATGGTGGTGCATATCTATATGGACTTTCCAAGTGTGGTG  
 CAACGCAGAATTTGATGATGGCAGCGACTCTGGCTGATGGGGTGACAGTGATTGAGAATGTGCGCGTGAGCCGTG  
 40 AGATTGTTGACTTAGCCATTCTCCTTAATGAAATGGGAGCCAAGGTCAAAGGTGCTGGTACAGAGACTATAACCAT  
 TACTGGTGTGAGAAACTTCATGGTACGACTCACAAATGTAGTCCAAGACCGTATCGAAGCAGGAACCTTTATGGTA  
 GCTGCTGCCATGACTGGTGGTGTGCTTGTGATTCGAGACGCTGTCTGGGAGCACAAACCGTCCCTTGATTGCCAAGTT  
 ACTTGAATGGGTGTTGAAGTAATTGAAGAAGACGAAGGAATTCGTGTTCTGTTCTCAACTAGAAAAATCTAAAAGCT  
 GTTCATGTGAAAACCTTGCCCCACCCAGGATTTCCAACAGATATGCAGGCTCAATTTACAGCCTTGATGACAGTTG  
 45 CAAAAGGCGAATCAACCATGGTGGAGACAGTTTTCGAAAATCGTTTCCAACCTAGAAAGATGCGCCGCATGGG  
 CTTGCATTCTGAGATTATCCGTGATACAGCTCGTATTGTTGGTGGACAGCCTTTGCAGGGAGCAGAAAGTCTTTCAA  
 CTGACCTTCGTGCCAGTGCGGCCCTTGATTTTGACAGGTTTGGTAGCACAGGGAGAACTGTGGTTCGGTAAATTGGT  
 TCACTTGGATAGAGGTTACTACGGTTTCCATGAGAAAGTTGGCGCAGCTAGGTGCTAAGATTACAGCGGATTGAGGCA  
 50 AGTGATGAAGATGAATAA

(SEQ ID NO: 140)

55 MKSRVKETSMKDIVVQGGDNRLVGSVTIEGAKNAVLPLLAATILASEGKTVLQNVPI LSDVFIMNQVVGGLNAKVDFD  
 EEHLVKVDATGDITEAPYKYVSKMRASIVVLGPILARVGHAKVSMPPGCTIGSRPIDLHLKGLEAMGVKISQTAGYIE  
 AKAERLHGAHIYMDFPSVGATQNLMMMAATLADGVTVIENAAREPEIVDLAILLNEMGAKVKGAGTETITITGVEKLHGT  
 THNVVQDRIEAGTFMVAAAMTGGDVLIRDVWEHNRPLIAKLLMGVEVIEDEGIRVRSQLENLKAHVHVKTLPHPGF  
 PTDMQAQFTALMTVAKGESTMVETVFENRFQHLEEMRRMLHSEIIRDTARIVGGQPLQGAEVLSTDLRASAALILTGL  
 VAQGETTVGKLVLDRGYGFHEKLAQLGAKIQRIEASDEDE

**ID125 1101bp**

(SEQ ID NO: 141)

60 ATGTTATTACGCTAACAGTAGCCTTGTCAATTTGCCCCAGTATTGGCAACTCAAGCAGAAGAAGTTCTTTGGACTGC  
 ACGTAGTGTGAGCAAAATCCAAAACGATTTGACTAAAACGGACAACAAAAACAAGTTATACCGTACAGTATGGTGA  
 TACTTTGAGCACCATTGCAGAAGCCTTGGGTGTAGATGTACAGTGCTTGCGAATCTGAACAAAATCACTAATATG  
 65 GACTTGATTTTCCAGAACTGTTTTGACAACGACTGTCAATGAAGCAGAAGAAGTAACAGAAGTTGAAATCCAAA  
 CACCTCAAGCAGACTCTAGTGAAGAAGTGACAACTGCGACAGCAGATTGACCACTAATCAAGTGACCGTTGATG

ATCAAAGTTCAGGTTGCAGACCTTTCTCAACCAATTGCAGAAGTTACAAAGACAGTGATTGCTTCTGAAGAAGT  
 GGCACCATCTACGGGCACTTCTGTCCAGAGGAGCAAACGACCGAAACAACTCGCCAGTTGCAGAAGAAGCTCC  
 TCAGGAAACGACTCCAGCTGAGAAGCAGGAAACACAAACAAGCCCTCAAGCTGCATCAGCAGTGGAAGCAACTAC  
 5 AACAAGTTCAGAAGCAAAAGAAGTAGCATCATCAATGGAGCTACAGCAGCAGTTTCTACTTATCAACCAGAAGA  
 AACGAAAGTAATTTCAACAACCTTACGAGGCTCCAGCTGCGCCGATTATGCTGGACTTGCAGTAGCAAAATCTGAA  
 AATGCAGGTCTTCAACCACAAACAGCTGCCTTTAAWGAAGAAATTTGCTAAGTTGTTTGGCATTACATCCTTTAGTG  
 GTTATCGTCCAGGAGACAGTGGAGATCACGGAAGGTTTGGCTATCGACTTTATGGTACCAGAACGTTTCAGAAAT  
 AGGGGATAAGATTGCGGAATATGCTATTCAAAATATGGCCAGCCGTGGCATTAGTTACATCATCTGGAAACAACGT  
 10 TTCTATGCTCCATTGATAGCAAAATATGGCCAGCTTAACACTTGAACCCAATGCCAGACCGTGGTAGTGTGACAG  
 AAAATCACTATGATCACGTTACGTTTCAATGAATGGATAA

(SEQ ID NO: 142)

MLLASTVALSFAPVLATQAEVLWTARSVEIQNDLTKTDNKTSYTVQYGDTLSTIAEALGVDVTVLANLNKITNMDLI  
 15 FPETVLTTTVNEAEVTEVEIQTPQADSSSEVTTATADLTNNQVTVDDQTVQVADLSQPIAEVTKTVIASEEVAPSTGTSV  
 PEEQTITETTRPVAEAPQETTPAEKQETQTSQAASA VEATTTTSSAEKEVASSNGATAA VSTYQPEETKVISTTYEAPAAP  
 DYAGLAVAKSENAGLQPQTAAFKKKLLTCLALHPLVVIVTTEVEITEKVWLSTLWYQNVQNZGIRLRNMLFKIWPAVA  
 LVTSSGNNVSM LHSIANMGQLTLGTQCQT VVVZQKITMITFTFQZMD

#### **ID126 1281bp**

20

(SEQ ID NO: 143)

TTGTTTAAAGAAAAATAAGACATTCTTAATATTGCATTGCCAGCTATGGGTGAAAACTTTTTGCAGATGCTAATGG  
 GAATGGTGGACAGTTATTTGGTTGCTCATTTAGGATTGATAGCTATTTACAGGGGTTTCAGTAGCTGGTAATATTATC  
 25 ACCATTTATCAGGCGATTTTCATCGCTCTGGGAGCTGCTATTTCCAGTGTTATTTCAAAAAGCATAGGGCAGAAAG  
 ACCAGTCGAAGTTGGCCTATCATGTGACTGAGGCGTTGAAGATTACCTTACTATTAAGTTTCTTTTAGGATTTTG  
 TCCATCTTCGCTGGGAAAGAGATGATAGGACTTTTGGGGACGGAGAGGGATGTAGCTGAGAGTGGTGGACTGTAT  
 CTATCTTTGGTAGGCGGATCGATTGTTCTCTTAAGTTTAACTAGCTAGCTAGGAGCCTTGATTTCGTGCAACGCATAA  
 TCCACGTCTGCCTCTCTATGTTAGTTTTTATCCAATGCCTTGAATATCTTTTTCAAGTCTAGCTATTTTTGTTCTG  
 30 GATATGGGGATAGCTGGTGTGCTTGGGGGACAATTTGTGCTCGTTTGGTTGGTCTTGTGATTTTGTGGTCACAATT  
 AAAAGCTCCTTATGGGAAGCCAACCTTTGGTTTAGATAAGGAACTGTTGACCTTGGCTTTACCAGCAGCTGGAGAG  
 CGACTTATGATGAGGGCTGGAGATGTAGTGATCATTGCCTTGGTCTGTTTCTTTGGGACGGAGGCAGTTGCTGGGA  
 ATGCAATCGGAGAAGTCTTGACCCAGTTAACTATATGCCTGCCTTTGGCGTCGCTACGGCAACGGTCATGCTGTTG  
 GCCCGAGCAGTTGGAGAGGATGATTGGAAAAGAGTTGCTAGTTTGAAGTAAACAAACCTTTTGGCTTTCTCTGTTCC  
 35 TCATGTTGCCCCCTGTCCTTTAGTATATATGTCCTTGGGTGTACCAATTAACCTATCTCTATACGACTGATTCTCTAGCGG  
 TGGAGGCTAGTGTCTAGTGACACTGTTTTCACTACTTTGGGACCCCTATGACGACAGGAACAGTCATCTATACGGC  
 AGTCTGGCAGGGATTAGGAAATGCACGCCTCCCTTTTTATGCGACAAGTATAGGAATGTGGTGTATCCGCATTGGG  
 ACAGGATATCTGATGGGATTGTGCTTGGTTGGGCTTGCTGTTTGGGACGGCTCTCTTGGATAATGGTTT  
 TCGCTGGTTATTTCTACGCTATCGTTACCAGCGCTATATGAGCTTGAAAGGATAG

40

(SEQ ID NO: 144)

LFKKNKDILNIALPAMGENFLQMLMGMVDSYLV AHLGLIAISGVSVAGNIITIYQAIFIALGAAISSVISKSIGQKDQSKLA  
 YHVTEALKITLLLSFLLGFLSIFAGKEMIGLLGTERDVAESGGLYLSLVGGSIVLLGLMTSLGALIRATHNPRPLVVSFLS  
 45 NALNLFSSLAIFVLDMGIAGVAVGTIVSRLVGLVLWSQLKLPYGKPTFGLDKELLTLALPAAGERLMMRAGDVIIAL  
 VVSFGTEAVAGNAIGEVLTFQNYMPAFGVATATVMLLARAVGEDDWKRVASLSKQTFWLSLFLMLPLSFSIYVLGVPL  
 THLYTDSLVAEASVLTFLSLLGTPMTTGTVIYTA VVWQGLGNARLPFYATSIGMWICIRIGTYGLMGIVLWGLPGIWA  
 GSLLDNGFRWFLRYRYQRYMSLKG

#### **ID127 894bp**

50

(SEQ ID NO: 145)

GTGGGAAGAATTATCAGAGCAGGTGTAAGATGGAACATCTTGGAAAAGTATTTCTGTAATTTCGAACAAGTGGA  
 AATTATTCTTTAAAGGAAGCAGCAGGCGAATCTGCTCTACCTCTCAGTTATCTCGCTTTGAGCTTGGGGAGTCTGA  
 55 CCTGGCAGTCTCCCGTTTCTTTGAGATTTTGGATAACATTCATGTAACAATCGAAAATTTTCATGGATAAGGCAAGGA  
 ATTTTCATAATCATGAACATGTGTCTATGATGGCACAGATTATCCCACTTTACTATTCAAACGATATTGCAGGTTTT  
 CAAAAGCTTCAAAGAGAACAACCTTGAAAAGTCTAAGAGTTCGACGACTCCCTTTATTTTGGAGCTGAAGTGGATT  
 TGCTACAAGGTCTGATTTGTCAAAGAGATGCGAGTTATGATATGAAGCAGGATGATTTGGGTAAAGGTAGCAGATTA  
 TCTCTTCAAACAGAGAAGATGGACCATGTATGAGTTGATTCTTTTCGGTAACCTCTATAGTTTCTACGATGTAGACT  
 60 ATGTCACCTCGGATTGGTAGAGAAGTTATGGAGAGGGAGGAATTTTACCAAGAGATTAGTCGCCATAAGAGATTAG  
 TGTGATTTTGGCCCTCAATTGTTACCAGCATGTTTATAGAGCATTTCTCTTTTATAATGCCAACTATTTTGGAGGCTT  
 ATACAGAGAAGATTATTGACAAAGGTATTAAGCTTTATGAGCGTAATGTTTCCATTATTTAAAGGTTTTCCTTA  
 TATCAAAAAGGACAGTGTAAGAAAGGCTGTAAGCAGATGCAAGAGGCCATGCATATTTTGTATGTGTTAGGTCTTC  
 CAGAGCAAGTAGCCTATTATCAGGAACACTACGAAAAATTTGTCAAAAAGTTAA

65

(SEQ ID NO: 146)

VGRIRAGVKMEHLGKVFREFRTSGNYS LKEAAGESCSTSQLSRFELGESDLA VSRFFEILDNIHV TIENFMDKARNFHNH  
 EHVSMMAQIIPLYSNDIAGFQKLQREQLEKSKSSTTPLYFELN WILLQGLICQRDASYDMKQDDLGKVADYLFKTEEW

TMYELILFGNLYSFYDVDYVTRIGREVMEREEFYQEISRHKRLVLILALNCYQHCLHSSFYNNANYFEAYTEKIIDKGIKL  
YERNVFHYLKGfALYQKGQCKEGCKMQEAMHIFDVLGLPEQVAYYQEHYEKfVKS

**TABLE 3****ID1 1068bp**

5 (SEQ ID NO: 147)  
 ATGTCTAACATTCAAAACATGTCCTGGAGGACATCATGGGAGAGCGCTTTGGTCGCTACTCCAAGTACATTATTC  
 AAGACCGGGCTTTGCCAGATATTCGTGATGGGTTGAAGCCGGTTCAGCGCCGTATTCTTTATTCTATGAATAAGGAT  
 AGCAATACTTTTGACAAGAGCTACCGTAAGTCGGCCAAGTCAGTCGGGAACATCATGGGGAATTTCCACCCACACG  
 10 GGGATTCTTCTATCTATGATGCCATGGTTCGTATGTACAGAAGTGGAAAAATCGTGAGATTCTAGTTGAAATGCA  
 CGGTAATAACGGTCTATGGACGGAGATCCTCCTGCGGCTATGCGTTATACTGAGGCACGTTTGTCTGAAATTGCA  
 GGCTACCTTCTTCAGGATATCGAGAAAAAGACAGTTCCTTTTGCATGGAACTTTGACGATACGGAGAAAGAACC  
 CGGTCTTGCCAGCAGCCTTTCCAAACCTCTTGGTCAATGGTTCGACTGGGATTTCCGGTGGTTATGCCACAGACATT  
 CCTCCCCATAATTTAGCTGAGGTCTAGATGCTGCAGTTTACATGATTGACCACCCAAGTTCGAAAGATTGATAAAC  
 15 TCATGGAATTCTTGCCTGGACAGACTTCCCTACAGGGGCTATTATTCAAGGGTCGTGATGAAATCAAGAAAGCTTA  
 TGAGACTGGGAAAGGGCGCGTGGTTGTTTCGTTCCAAGACTGAAATTGAAAAGCTAAAAGGTGGTAAGGAACAAAT  
 CGTTATTATTGAGATTCTTATGAAATCAATAAGGCCAATCTAGTCAAGAAAAATCGATGATGTTTCGTGTTAATAAC  
 AAGGTAGCTGGGATTGCTGAGGTTCGTGATGAGTCTGACCGTATGGTCTTCGTATCGCTATCGAACTTAAGAAAG  
 ACGCTAATACTGAGCTTGTCTCAACTACTTATTTAAGTACACCGACCTACAAATCAACTACAACTTTAATATGGTG  
 20 GCGATTGACAATTTACACCTCGTCAGGTTGGATTGTTCCAATCCTGTCTAGCTATATCGCTCACCCTCGAGAAGTG  
 A

(SEQ ID NO: 148)  
 MSNIQNMSLEDIMGERFGRYSKYIIQDRALPDIRDGLKPVQRRILYSMNKDSNTFDKSYRKSASVGNIMGNFHPHGDSS  
 IYDAMVRMSQNWKNREILVEMHGNNGSMDGDPAAAMRYTEARLSEIAGYLLQDIEKKTVPFAWNFDDTEKEPTVLP  
 25 AFPNLLVNGSTGISAGYATDIPPHNLAVIDAAVYIMIDHPTAKIDKLMEFLPGDPFPTGAIQGRDEIKKAYETGKGRVV  
 RSKTEIEKLKGGKEQIVIIIEIPYEINKANLVKKIDDVVRVNNKVAGIAEVRDES DRDGLRIAIELKKDANTELVNLVLFKY  
 TLQINYNFMVAIDNFTPRQVGLFQSCLAISLTVEK

**ID12 684bp**

30 (SEQ ID NO: 149)  
 ATGCCGACATTAGAAAATAGCACAAAAAACTGGAGTTCATTAAGAAGGCAGAAAGAAATTACAATGCCTTGTGT  
 ACAAAATATACAGTTGAGCGGAGATAAACTAAAAGTAATTTCCGTTACTTCTGTTAACCTGGGGAAGGAAAAACA  
 ACTACTTCCATAAAATATAGCATGGTCGTTTGGCGCTGCAGGCTATAAACTCTTTTGATCGATGGCGATACTCGAAA  
 35 TTCAGTTATGTTAGGAGTTTTTAAATCTCGTGAAAAAATTACAGGGCTAACAGAAATTTTATCTGGGACAGCTGATT  
 TATCTACGGTTTATGTGATACAAATATTGAAAAATTTATTTGTAGTTCAATCGGGATCTGTATCACCAAAACCTTACA  
 GCCTTGTTACAAAGTAAAAATTTAATGATATGATTGAAACATTGCGTAAATATTTTGATTATCATTATTGATAC  
 ACCGCCTATTGGAATTGTTATTGATGCGGCAATTATCACTCAAAAGTGTGATGCGTCCATCTGGTAAACAGCAACA  
 40 GGTGAGGCGAATAAACCTGATATCCAAAAAGCGAAACACAATTAAAAACAAACAGGGAACTGTTCTAGGAGTT  
 GTTTTAAATAAATTGGATATCTCGGTTAATAAGTATGGAGTTTACGGTTCCTATGGAAATTATGGTAAAAAATAA

(SEQ ID NO: 150)  
 MPTLEIAQKKLEFIKKAEEYYNALCTNIQLSGDKLVISVTSVNPGEKTTTSINIAWSFARAGYKTLIDGDTRNSVMLG  
 45 VFKSREKITGLTEFLSGTADLSHGLCDTNIEENLFVVSQGSVSPNPTALLQSKNFNDMIETLRKYFDYIIIDTPPIGIVIDAII  
 TQKCDASILVTATGEANKRDIQKAKQQLKQTKGLFLGVVLNKLDISVKNYGVYGSYGNYGKK

**ID13 1182bp**

50 (SEQ ID NO: 151)  
 ATGGAGGCAAAATATGAAACATCTAAAAACATTTTACAAAAAATGGTTTCAATTATTAGTCGTTATCGTCATTAGCTT  
 TTTTAGTGAGCCTTGGGTAGTTTTTCAATAACTCAACTAACTCAAAAAAGTAGTGTAACAACCTCAACAACAAT  
 AGTACTATTACACAAACTGCCTATAAGAACGAAAAATTCACAAACACAGGCTGTTAACAAAGTAAAAAGATGCTGTT  
 GTTCTGTTATTACTTATTCGGCAAAACAGACAAAAATAGCGTATTTGGCAATGATGATACTGACACAGATTCTCAGCG  
 55 AATCTCTAGTGAAGGATCTGGAGTTATTTATAAAAAAGAAATGATAAAGAAAGCTTACATCGTCACCAACAATCACGTT  
 ATTAATGGCGCGCAGCAAAAGTAGATATTCGATTGTCAGATGGGACTAAAGTACCTGGAGAAATTTGCGGAGCTGAC  
 ACTTTCTCTGATATTGCTGTCGTCAAAATCTCTTCAGAAAAAGTGACAACAGTAGCTGAGTTTGGTGATTCTAGTAA  
 GTTAAGTGTAGGAGAAACTGCTATTGCCATCGGTAGCCCGTTAGGTTCTGAATATGCAAAATCTGTCACTCAAGGT  
 ATCGTATCCAGTCTCAATAGAAATGTATCCTTAAATCGGAAGATGGACAAGCTATTCTACAAAAGCCATCCAAA  
 60 CTGATACTGCTATTAAACCCAGGTAACCTCTGGCGGCCCACTGATCAATATTCAAGGCGAGGTTATCGGAAATTACCTC  
 AAGTAAAAATTGCTACAAATGGAGGAACATCTGTAGAAGGTCTTGGTTTCGCAATTCCTGCAAAATGATGCTATCAAT  
 ATTAATTGAACAGTTAGAAAAAAACGGAAGGTGACCGCTCCAGCTTTGGGAATCCAGATGGTTAATTTATCTAATG  
 TGAGTACAAGCGACATCAGAAGACTCAATATTCGAAGTAATGTTACATCTGGTGTAAATGTTTCGGTACCAAG  
 65 TAATATGCCTGCCAATGGTCACCTTGA AAAATACGATGTAATTACAAAAGTAGATGACAAAAGAGATTGCTTCAATCA  
 ACAGACTTACAAAAGTGCTCTTTACAACCATCTATCGGAGACACCATTAAAGATAACCTACTATCGTAACGGGAAAG  
 AAGAAACTACCTCTATCAAACTTAACAAGAGTTCAGGTGATTAGAATCTTAA

(SEQ ID NO: 152)

MEANMKHLKTFYKKWFQLLVVIVISFFSGALGSFSITQLTQKSSVNNNSNNNSTITQTA YKNENSTTQAVNKVKDAVVSV  
 ITYSANRQNSVFGNDDTDTDSQRISSESGSVIYKKNDKEAYIVTNNH VINGASKVDIRLSDGKVPGEIVGADTFSDIAVV  
 KISSEKVTTVAEFGDSSKLTVGETAIAIGSPLGSEYANTVTQGI VSSLNRNVSLKSEDGQAISTKAIQTDTA INPGNSGGPLI  
 NIQQQVIGITSSKIATNGGTSVEGLGFAIPANDAINIEQLEKNGKVTRPALGIQMVNLSNVSTSDIRRLNIPSNVTSGVIVR  
 SVQSNMPANGHLEKYDVITKVDDKEIASSTDLQSA LYNHSIGDTIKITYYRNGKEETTSIKLNKSSGDLES

**ID15 939bp**

(SEQ ID NO: 153)

ATGGCAGAAATTTATCTAGCAGGTGGTTGTTTTGGGGCCTAGAGGAATATTTTTACGCATTTCTGGAGTGCTAGA  
 AACCAAGTGTGGCTACGCTAATGGTCAAGTCGAAACGACCAATTACCAGTTGCTCAAGGAAACAGACCATGCAGA  
 AACGGTCCAAGTGATTTACGATGAGAAGGAAGTGTCACTCAGAGAGATTTTACTTTATTATTTCCGAGTTATCGATC  
 CTCTATCTATCAATCAACAAGGGAATGACCGTGGTCGCCAATATCGAACTGGGATTTATTATCAGGATGAAGCAGA  
 TTTGCCAGCTATCTACACAGTGGTGCAGGAGCAGGAACGCATGCTGGGTGCAAAGATTGCACTAGAAGTGGAGCA  
 ATTACGCCACTACATTCTGGCTGAAGACTACCACCAAGACTATCTCAGGAAGAAATCCTTCAGGTTACTGTCATATC  
 GATGTGACCGATGCTGATAAGCCATTGATTGATGCAGCAAACATGAAAAGCCTAGTCAAGAGGTGTTGAAGGCC  
 AGTCTATCTGAAGAGTCTTATCGTGTACACACAAGAAGCTGCTACAGAGGCTCCATTTACCAATGCCTATGACCAAA  
 CCTTTGAAGAGGGGATTTATGTAGATATTACGACAGGTGAGCCACTCTTTTTGCCAAGGATAAGTTTGCTTCAGGT  
 TGTGGTTGGCCAAGTTTTAGCCGTCGATTTTCCAAAGAGTTGATTCAATTATACAAGGATCTGAGCCATGGAATGG  
 AGCGAATTGAAGTTCGTTCTCGTTCAGGCAGTGCTCACTTGGGTCATGTTTTACAGATGGACCGCGGGAGTTAGG  
 CGGCCTCCGTTACTGTATCAATTCTGCTTCTTTACGCTTTGTGGCCAAGGATGAGATGGAAAAAGCAGGATATGGCT  
 ATCTATTGCCTTACTTAAACAAATAA

(SEQ ID NO: 154)

MAEIYLAGGCFWGLEEYFSRISGVLETSVG YANGQVETNNYQLKETDHAETVQVIYDEKEVSLREILLYYFRVIDPLSN  
 QQGNDRGRQYRTGIYYQDEADLPAIYTVVQEQRMLGRKIAVEVEQLRHYILAEDYHQDYLRKNPSGYCHIDVTDADK  
 PLIDAANYEKPSQEV LKASLSEESYRVTEAAATEAPFTNAYDQTFEEGIYVDITTEGPLFFAKDKFASGCGWPSFSRPISE  
 LIHYKDLSHGMERIEVRSRSGSAHLGHVFTDGPRELGLRYCINSASLRFVAKDEMEKAGYGYLLPYLNK

**ID17 870bp**

(SEQ ID NO: 155)

ATGAAGATTATTGTACCTGCAACCAGTGCCAATATCGGGCCAGGTTTTGACTCGGTGCGGTGTAGCTGTAACCAAGT  
 ATCTTCAAATGAGGTCTGCGAAGAACGAGATGAGTGGCTGATTGAACACCAGATTGGCAAATGGATTCCACATGA  
 CGAGCGTAATCTCTTGCTCAAAAATCGCTTTGCAAATTTGACCAGACTTGCAACCAAGACGCTTGAAAATGACCAAGT  
 GATGTCCTTTGGCGCGCGGTTTGGGTTCTTCAGCTCGGTTATCGTTGCTGGGATTGAACTAGCCAACCAACTGGG  
 TCAACTCAACTTATCAGACCATGAAAAATTGCAGTTAGCGACCAAGATTGAAGGGCATCCTGACAATGTGGCTCCA  
 GCCATTTATGGTAATCTCGTTATTGCAAGTTCTGTTGAAGGGCAAGTCTCTGCTATCGTAGCAGACTTTCCAGAGTG  
 TGATTTTCTAGCTTACATTCCAACTATGAATTACGTACTCGCGACAGCCGTAGTGTCTTGCTTAAAAAATTGTCTT  
 ATAAGGAAGCTGTTGCTGCAAGTTCTATCGCCAATGTAGCGGTTGCTGCCTTGTGGCAGGAGACATGGTGACCGC  
 TGGGCAAGCAATCGAGGGAGACCTCTTCCATGAGCGCTATCGTCAGGACTTGGTAAGAGAAATTTGCGATGATTAAAG  
 CAAGTGACCAAAGAAAAATGGGGCCTATGCAACCTACCTTTCTGGTGCTGGGCGGACAGTTATGGTTCTGGCTTCTC  
 ATGACAAGATGCCAACAAATTAAGGCAGAAATGGAAAAGCAACCTTTCAAAGGAAAACTGCATGACTTGAGAGTTG  
 ATACCAAGGTGTCCGTGTAGAAGCAAAATAA

(SEQ ID NO: 156)

MKIIVPATSANIGPGFDSVGVA VTKYLQIEVCEERDEW LIEHQIGKWIPHDERNLLLKIALQIVPDLQPRRLKMTSDVPLA  
 RGLGSSSSVIVAGIELANQLGQLNLS DHEKLQLATKIEGHPDNVAPAIYGNLVIASSVEGQVSAIVADFPEDFLAYIPNY  
 ELRTRDSRSVLPKLSYKEAVAASSIANVAVAALLAGDMVTAGQAIEGDLFHERYRQDLVREFAMIKQVTKENGAYAT  
 YLSGAGPTVMVLASHDKMPTIKAELEKQPFKGLHDLRVD TQGV RVEAK

**ID20 564bp**

(SEQ ID NO: 157)

ATGAAATATCACGATTACATCTGGGATTTAGGTGGAACTTTACTGGATAATTATGAAACTTCAACAGCTGCATTTGT  
 TGAAACATTGGCACTGTATGGTATCACACAAGACCATGACAGTGTCTATCAAGCTTTAAAGGTTTCTACTCCTTTTG  
 CGATTGAGACATTCGCTCCCAATTTAGAGAATTTTTAGAAAAAGTACAAGGAAAAATGAAGCCAGAGAGCTTGAAC  
 ACCCGATTTTATTTGAAGGAGTTTCTGACCTATTGGAAGACATTTCAAATCAAGGTGGCCGTCATTTTTTGGTCTCT  
 CATCGAAATGATCAGGTTTTGGAATTTTAAAAAAACCTCTATAGCAGCTTATTTTACAGAAGTGGTGACTTCTA  
 GCTCAGGCTTTAAGAGAAAAGCCAAATCCCGAATCCATGCTTTATTTAAGAGAAAAGTATCAGATTAGCTCTGGTCT  
 TGCTATTGGTGATCGGCCGATTGATATCGAAGCAGGTCAAGCTGCAGGACTTGATACCCACTTGTGTTACCAGTATC  
 GTGAATTTAAGACAAGTATTAGACATATAA

(SEQ ID NO: 158)

MKYHDIWDLGGTLLDNYETSTA AFVETLALYGITQDHDSVYQALKVSTPFAIETFPNLENFLEKYKENEARELEHPIL  
FEGVSDLLEDISNQGRHFLVSHRNDQVLEILEKTSIAAYFTEVVTSSSGFKRKPNPESMLYLRKYQISSGLVIGDRPIDIE  
AGQAAGLDTHLFTSIVNLRQVLDI

5 **ID21 1875bp**

(SEQ ID NO: 159)

ATGACAGAAGAAATCAAAAATCTGCAGGCACAGGATTATGATGCCAGTCAAATTTCAAGTTTTAGAGGGCTTAGAG  
10 GCTGTTTCGTATGCGTCCAGGGATGTACATTGGATCAACCTCAAAAAGAAGGTCTTCACCATCTAGTCTGGGAAATTG  
TTGATAACTCAATTGACGAGGCCTTGGCAGGATTGGCCAGCCATATTCAAGTTTTATTAGCCAGATGATTGCGATT  
ACTGTTGTGGATGATGGGCGTGGTATCCCAGTGCATATTCAGGAAAAAACAGGCCGCTCTGCTGTTGAGACCGTCT  
TTACAGTCCCTTACGCTGGAGGAAAGTTCCGGCGGTGGTGGATACAAGGTTTCAGGTGGTCTTCACGGGGTGGGGTC  
15 GTCAGTAGTTAATGCCCTTCCACTCAATTAGACGTTTCATGTTTCAAAAAATGGTAAGATTCATTACCAAGAATACC  
GTCGTGGTCAATGTTGTCGCAGATCTTGAAATAGTTGGAGATACGGATAAAACAGGAACAACGTTTCACTTCACACC  
GGACCCAAAAATCTTCACTGAAACAACAATCTTTGATTTTGATAAATTAATAAACCGGATTCAAGAGTTGGCCTTT  
CTAAATCGCGGTCTTCAAAATTTCAATTACAGATAAGCGCCAAAGGTTTGGAAACAAACCAAGCATTATCATTATGAAG  
GTGGGATTGCTAGTTACGTTGAATATATCAACGAGAACAAGGATGTAATCTTTGATACACCAATCTATACAGACGG  
20 TGAGATGGATGATATCACAGTTGAGGTAGCCATGCAGTACACAACCTGGTTACCATGAAAAATGTCATGAGTTTCGCC  
AATAATATTCATACCCATGAAGGTGGAACACATGAACAAGGTTTCCGTACAGCCTTGACACGTTTATCAACGATT  
ATGCTCGTAAAAATAAGTTACTGAAAGACAATGAAGATAATTTAAACAGGGGAAGATGTTTCGCGAAGGCTTAACG  
CAGTTATCTCAGTTAAACACCCAAATCCACAGTTTGAAGGACAAACCAAGACCAAAATTGGGAAATAGCGAAGTGG  
TCAAGATTACCAATCGCCTCTTCACTGAAGCTTTCTCCGATTTCTCATGGAAAAATCCACAGATTGCCAAACGATC  
25 GTAGAAAAAGGAATTTGGCTGCCAAGGCTCGTGTGGCTGCCAAGCGTGCGCGTGAAGTCACACGTAATAAAATCT  
GGTTTGGAAATTTCCAACCTTCCAGGGAACTAGCAGACTGTTCTTCTAATAACCTGCTGAAACAGAACTCTTCAT  
CGTCGAAGGAGACTCAGCTGGTGGATCAGCCAAATCTGGTTCGTAACCGTGAGTTTCAGGCTATCCTTCCAATTCGC  
GGTAAGATTTTGAACGTTGAAAAAGCAAGTATGGATAAGATTCTAGCCAACGAAGAAATTCGTAGTCTTTTACAG  
CCATGGGAACAGGATTTGGCGCAGAAATTTGATGTTTCGAAAGCCCGTTACCAAAAACCTCGTTTGTGACCGGATGC  
CGATGTGATGGAGCCACATTCGTACCTTCTTTAACCTTGATTTATCGTTATATGAAACCAATCTAGAAGCTG  
30 GTTATGTTTATATTGCCCAACCAATCTATGGTGTCAAGGTTGGAAGCGAGATTAAAGAATATATCCAGCCGGG  
TGCAGATCAAGAAATCAAACTCCAAGAAGCTTACGCCGTTATAGTGAAGGTCGTACCAAAACCGACTATTACGCGT  
TATAAGGGGCTAGGTGAAATGGACGATCATCAGCTGTGGGAAACAACCATGGATCCCGAACATCGCTTGATGGCT  
AGAGTTTCTGTAGATGATGTGCAGAAGCAGATAAAATCTTTGATATGTTGA

(SEQ ID NO: 160)

15 MTEEIKNLQAQDYDASQIQVLEGLEAVRMRPGMYIGSTSKEGLHHLVWEIVDNSIDEALAGFASHIQVFIEPDDSTIVVD  
DGRGIPVDIQEKTGRPAVETVFTVLHAGGKFGGGGYKVSGLHGVGSSVVNALSTQLDVHVHKNKGIHYQEYRRGHV  
VADLEIVGDTDKTGTTFVHTPDKIFTETTFDFDKLNKRIQELAFNRLQISITDKRQGLEQTKHYHIEGGIASYVEYIN  
ENKDVIFDTPYTDGEMDDITVEVAMQYTTGYHENVMSFANNIHTHEGGTHEQGFRTALTRVINDYARKNKLKDNED  
40 NLTGEDVREGLTAVISVKHPNPQFEGQTKTKLGNSEVVKITNRLFSEAFSDFLMENPQIAKRIVEKGILAAKARVAAKRA  
REVTRKKSGLISNLPGLADCSSNNPAETELFIVEGDSAGGSAKSGRNRFPQAILPIRGKILNVEKASMDKILANEEIRSL  
FTAMGTGFGAEFDVSKARYQKLVLMTDADVDGAHIRTLLTLIYRYMKPILEAGYVYIAQPPIYGVKVGSEIKEYIQPGA  
DQEIKLQEALARYSEGRKPTIQRKYLKLGEMDDHQLWETTMDEPHRLMARVSVDDVQKQIKSLIC

45 **ID54 1446bp**

(SEQ ID NO: 161)

ATGAGTAGACGTTTTAAAAAATCACGTTACAGAAAAGTGAAGCGAAGTGTTAATATAGTTTTGCTGACTATTTATTT  
ATTGTTAGTTTGTTTTTATTGTTCTTAATCTTTAAGTACAATATCCTTGCTTTTAGATATCTTAATCTAGTGGTAAC  
50 GCGTTAGTCTACTAGTTGCCTTGGTAGGGCTACTCTTGATTATCTATAAAAAAGCTGAAAAGTTTACTATTTTTCT  
GTTGGTGTCTCTATCCTTGTCAGCTCTGTGTCGCTCTTTCAGTACAGCAGTTTGTGGACTGACCAATCGTTTAAA  
TGCGACTTCTAATTACTCAGAATATTCAATCAGTGTGCTGTTTTCAGAGATAGTGAGATCGAAAAATGTTACGCAAC  
TGACGAGTGTGACAGCACCGACTGGGACTAATAATGAAAAATATTAGAAAAATTTACTAGCTGATATCAAGTCAAGTCA  
GAATACCGATTTGACGGTCAACAGAGTTCTGTTACTTGGCAGCTTACAAGAGTTTGATTGCAGGGGAGACTAAG  
60 GCCATTGCTCAAAATAGTGTCTTTGAAAACATCATCGAGTCAGAGTATCCAGACTACGCATCGAAGATAAAAAAGA  
TTTATACTAAGGGATTCACTAAAAAAGTAGAAGCTCCTAAGACGCTTAAGAGTCAGTCTTCAATATCTATGTTAGT  
GGAATTGACACCTATGGTCTATTAGTTCCGGTGTGCGGATCAGATGTCAACATCCTGATGACTGTCAATCGAGATA  
CCAAGAAAAATCCTCTTGACCACAACGCCACGTGATGCCTATGTACCAATCGCAGATGGTGGAAATAATCAAAAAG  
ATAAATTGACTCATCGGGCATTTATGGAGTTGATTTCGTCATTACACCTTAGAAAAATCTCTATGGAGTGGATATC  
65 AATTACTATGTGCGATTGAACCTTCACTTCGTTTTTGAAATTGATTGATTTGTTGGGTGGAATTGATGTTTATAATGAT  
CAAGAATTTACTGCCCATACGAATGGAAGTATTACCCTGCAGGCAATGTTTCATCTTGATTGAGAACAGGCTCTCG  
GTTTTGTTCTGAGCGCTACTCCCTAGCAGATGGCGATCGTGACCGCGGGCGCCATCAACAAAAGGTGATTGTGCGC  
TATCTTCAAAAAATTAACGTCAACCGAAGTGTGTAATAATTAGTACGATCAATTAATAGTTCGAAGATTCTATC  
CAAAACAAATATGCCACTTGAGACCATGATAAATTTGGTCAATGCTCAGTTAGAAAGTGGAGGGGAATTATAAAGTA  
AATTCTCAAGATTTAAAAGGGACAGGTGGATGATCTTCTTCTTATGCAATGCCAGACAGTAACCTCTATGTGA  
TGGAATAGATGATAGTAGTTTAGCTGTAGTTAAAGCAGCTATACAGGATGTGATGGAGGGTAGATGA

(SEQ ID NO: 162)

MSRRFKRSRQKVKRSVNIVLLTIYLLVCFLLFLIFKYNILAFRYLNLVVTALVLLVALVGLLLIYKKA EKFTIFLLVFSI  
 LVSSVSLFAVQQFVGLTNRLNATSNYSEYSISVAVLADSEIENVTLTSVTAPTGTNNENIQKLLADIKSSQNTDLTVNQ  
 SSSYLAA YKSLIAGETKAIVLNSVFENIIESEYPDYASKIKKIYTKGFTKKVEAPKTSKQSFNIVSGIDTYGPISSVSRSDV  
 NILMTVNRDTKKILLTTTPRDAYVPIADGGNNQKDKLTHAGIYGVDSIHTLENLYGVDINYVRLNFTSFLKLLIDLLGGI  
 DVYNDQEFTAHTNGKYYPAGNVHLDSEQALGFVRERYSLADGDRDRGRHQQKVIVAILQKLTSTEV LKNYSTIINSLQD  
 SIQTNMPLETMINLVNAQLES GGNYKVNSQDLKGTGRMDLPSYAMPDSNLYVMEIDDSSLA VVKAAIQDVM EGR

**ID55 732bp**

(SEQ ID NO: 163)

ATGATAGACATCCATTCGCATATCGTTTTTGTATGATAGACGGTCCCAAGTCAAGAGAGGAAAGCAAGGCTCTCT  
 TGGCAGAATCCTACAGACAGGGGTGCGAACCATTTGTTTCTACCTCTCACCCTCGCAAGGGCATGTTTGAAACTCC  
 GGAAGAGAAGATAGCAGAAAACCTTCTTCAGGTTCCGGGAAATAGCTAAGGAAAGTGGCGAGTGACTTGGTCATTGC  
 TTACGGGGCTGAAATTTATTACACACCAGATGTTCTGGATAAGCTGGAAAAAAGCGGATTCCGACCCTCAATGAT  
 AGTCGTTATGCCTTGATAGAGTTTAGTATGAACACTCCTTATCGCGATATTCATAGCGCCTTGAGCAAGATCTTGAT  
 GTTGGGAATTACTCCAGTCATTGCCACATTGAGCGCTATGATGCTCTTGAAAAATAATGAAAAACGCGTTCGAGAA  
 CTGATCGATATGGGCTGTTACACGCAAGTAAATAGTTCACATGTCCTCAAACCCAACTTTTGGCGAACGTTATA  
 AATTCATGAAAAAAGAGCTCAGTATTTTTAGAGCAGGATTTGGTTCATGTCATTGCAAGTGATATGCACAATCT  
 AGACGGTAGACCTCCTCATATGGCAGAAGCATATGACCTTGTTACCCAAAAATACGGAGAAGCGAAGGCTCAGGA  
 ACTTTTTATAGACAATCCTCGAAAAATTGTAATGGATCAACTAATTTAG

(SEQ ID NO: 164)

MIDIHSHIVFDVDDGPKSREESKALLAESYRQGVRTIVSTSHRRKGMFETPEEKIAENFLQVREIAKEVASDLVIA YGAEI  
 YYTPDVLDKLEKKRIPTLNDSTRYALIEFSMNTPYRDIHSALSILMLGITPVIAHIER YDALENNEKRVRELIDMGCYTQV  
 NSSHVLPKPLFGERYKFMKKRAQYFLEQDLVHVIASDMHNLDRPPHMAEAYDLVTQKYGEAKAQELFIDNPRKIVM  
 DQLI

**ID58 3990bp**

(SEQ ID NO: 165)

TTGATTTATATAATCGCTATCAATATAACAATGCAATCAGGAGGTTTTGCAATGAAACATGAAAAACAACAGCGTT  
 TTTCTATTCTGTAATACGCTGTAGGAGCAGCTTCTGTTCTAATTGGATTTGCCTTCCAAGCACAGACTGTTGCAGCC  
 GATGGAGTTACTCCTACTACTACAGAAAACCAACCGACCATCCATACGGTTTCTGATTCCCTCAATCATCCGAAA  
 ATCGGACTGAGGAAACACCTAAAGCAGTGCTTCAACCAGAAGCTCCAAAACTGTAGAAACAGAAACTCCAGCTA  
 CTGATAAGGTAGCTAGTCTTCCAAAAACAGAAGAAAAACCAAGAGGAAGTTAGTTCAACTCTAGTGATAAAG  
 CAGAAGTGGTAACCTCAACTTCTGCTGAAAAAGAACTGCTAATAAAAAAGGCAGAGAAGCTAGCCCTAAAAAGG  
 AAGAAGCGAAAGAGGTTGATTCTAAAGAGTCAAATACAGACAAGACTGACAAGGATAAACCAGCTAAAAAAGAT  
 GAAGCGAAAGCAGAGGCTGACAAACCGGCAACAGAGGCAGGAAGGAACGTGCTGCAACTGTAAATGAAAAACT  
 AGCGAAAAAGAAAAATTGTTTCTATTGATGCTGGACGTAATATTCTCACCAGAACAGCTCAAGGAAATCATCGAT  
 AAAGCGAAACATTATGGCTACACTGATTTACACCTATTAGTCGGAAATGATGGACTCCGTTTCATGTTGGACGATA  
 TGAGCATCACAGCTAACGGCAAGACCTATGCCAGTGACGATGTCAAACGCGCCATTGAAAAAGGTACAAATGATT  
 ATTACAACGATCCAAACCGCAATCACITTAACAGAAAGTCAAATGACAGATCTGATTAACATGCCAAAGATAAAG  
 GTATCGGTCTCATTCGACAGTAAATAGCTCTGGACACATGGATGCGATTCTCAATGCCATGAAAGAATTGGGAAT  
 CCAAAACCTAACTTTAGCTATTTTGGGAAGAAATCAGCCCGTACTGTGCTCTTGACAACGAACAAGCTGTCGCT  
 TTTACAAAAGCCCTTATCGACAAGTATGCTGCTTATTCGCGAAAAAGACTGAAATCTTCAACATCGGACTTGATG  
 AATATGCCAATGATGCGACAGATGCTAAAGGTTGGAGTGTGCTTCAAGCTGATAAATACTATCCAAACGAAGGCTA  
 CCCTGTAAGGCTATGAAAAATTTATTGCTACGCCAATGACCTCGCTCGTATTGTAATAATCGCACGGTCTCAAA  
 CCAATGGCTTTTAACGACGGTATCTACTACAATAGCGACACAAGCTTTGGTAGTTTGTACAAAGACATCATCGTTTC  
 TATGTGGACTGGTGGTTGGGGAGGCTACGATGTGCTTCTTCTAACTACTAGCTGAAAAAGGTCACCAATCCTT  
 AATACCAATGATGCTTGGTACTACGTTCTTGGACGAAACGCTGATGGCCAAGGCTGGTACAATCTCGATCAGGGGC  
 TCAATGGTATTAACCAACACACCAATCACTTCTGTACCAAAAAACAGAGGAGCTGATATCCCAATCAATCGGTGGTAT  
 GGTAGCTGCTTGGGCTGACACTCCATCTGCACGTTATTCACCATCACGCCTCTTCAAACCTCATGCGTCATTTTGCAA  
 ATGCCAACGCTGAATACTTCGCAGCTGATTATGAATCTGCAGAGCAAGCACTTAACGAGGTACCAAAAGACCTGA  
 ACGTTTACTGCAGAAAGCGTCACGGCCGTAAGAAAGCTGAAAAAGCTATTCCGCTCTCTCGATAGCAACCTTAG  
 CCGTGCCCAACAAGATACGATTGATCAAGCCATTGCTAAACTTCAAGAAACTGTCAACAACCTTGACCCTCACGCCT  
 GAAGCTCAAAAAGAAGAAGAAGCTAAACGCTGAGGTTGAAAAACTTGCCAAAAACAAGGTAATCTCAATCGATGCT  
 GGACGCAAACTTACTCTGAACAGCTCAAACGCATCGTAGACAAGGCCAGTGAGCTCGGATATTCTGATGTCC  
 ATCTCCTTCTAGGAAATGACGGACTTCGCTTTCTACTCGATGATATGACCATTACTGCCAACGGAAAAACCTATGCT  
 AGTGATGACGTTAAAAAGCTATTATCGAAGGAACTAAAGCTTACTACGACGATCCAAACGGTACTGCACTAACA  
 CAGGCAGAAGTAACAGAGCTAATTGAATACGCTAAATCTAAGGACATCGGTCTCATCCAGCTATTAACAGTCCAG  
 GTCACATGGATGCTATGCTGGTTGCCATGGAAAAATTAGGTATTAAAAATCCTCAAGCCCACTTTGATAAAGTTTC  
 AAAAACAACTATGGACTTGAAAAACGAAGAAGCGATGAACCTTTGTAAGGCCCTCATCGGTAAATACATGGACTT  
 CTTTGCAGGTAACAAAGATTTTCACTTTGGTACTGACGAATACGCCAACGATGCGACTAGTGCCCAAGGCTGG  
 TACTACCTCAAGTGGTATCACTCTATGGCAATTTGCCGAATATGCCAACACCCTCGCAGCTATGGCCAAAGAAA  
 GAGGGCTTCAACCAATGGCCTTCAACGATGGCTTCTACTATGAAGACAAGGACGATGTTTCAAGTTGACAAAGATGT

CTTGATTCTTACTGGTCTAAAGGCTGGTGGGGATATAACCTCGCATCACCTCAATACCTAGCAAGCAAAGGCTAT  
 AAATCTTGAATACCAACGGTGACTGGTACTACATCTTGGTCAAAAACAGAAAGATGGTGGTGGTTTCTCAAGA  
 AAGCTATTGAGAACTACTGGAAAAACACCATTCATCAACTAGCTTCTACCAAATATCCTGAAGTAGATCTTCCAAC  
 AGTCGGAAGTATGCTTTCAATCTGGGCAGATAGACCAAGCGCTGAATACAAGGAAGAGGAAATCTTTGAACTCAT  
 GACTGCCTTTGCAGACCAACAACAAAGACTACTTTCTGTGCTAATTATAATGCTCTCCGCGAAGAAATTAGCTAAAAAT  
 CCTACAACTTAGAAGGATATAGTAAAGAAAGTCTTGGGCCCTTGACGCAGCTAAAACAGCTCTAAATTACAACC  
 TCAACCGTAATAACAAGCTGAGCTTGACACGCTTGAGCCAACTAAAAGCCGCTCTTCAAGGCCTCAAACCAAGC  
 TGTAATCATTCAGGAAGCCTAGATGAAAAATGAAGTGGTGCCAATGTTGAAACCAGACCAGAACTCATCACAAG  
 AACTGAAGAAATTCATTTGAAGTTATCAAGAAAGAAAAATCCTAACCTCCAGCCGGTCAGGAAAAATATTATCAC  
 GCAGGAGTCAAAGGTGAACGAACCTATTACATCTCTGTACTCACTGAAAAATGGAAAAACAACAGAAACAGTCTCT  
 GATAGCCAGGTAACCAAGAAAGTTATAAACCAAGTGGTTGAAGTTGGCGCTCTGTAACCTACAAGGGTGATGAA  
 AGTGGTCTTGACCAACTACTGAGGTAAAACCTAGACTGGATATCCAAGAAGAAGAAATTCATTTACCACAGTGA  
 CTTGTGAAAAATCCACTCTTACTCAAAGGAAAAACACAAGTCATTACTAAGGGCGTCAATGGACATCGTAGCAACTT  
 CTACTCTGTGAGCACTTCTGCCGATGGTAAGGAAGTGAAGAACTTGTAAATAGTGTCTGACACAGGAAGCCGTT  
 ACTCAAATAGTCGAAGTCGGAACCTATGGTAACACATGTAGGCGATGAAACCGGACAAGCCGCTATTGCTGAAGAA  
 AAACCAAAACTAGAAATCCCAAGCCAACCAAGCTCCATCAACTGCTCTGCTGAGGAAGCAAGAAAGTTCTTCTCAAG  
 ATCCAGCTCTGTGGTAACAGAGAAAAAACTTCTGAAACAGGAACCTACGATTCTGCAGGACTAGTAGTCGCAG  
 GACTCATGTCCACACTAGCAGCCTATGGACTCACTAAAAGAAAAAGAACTAA

(SEQ ID NO: 166)

MIYIIAINITMQSGGFAMKHEKQQRFSIRKYAVGAASVLIGFAFQAQTVAADGVTPPTTENQPTIHTVSDSPQSSSENREE  
 TPKAVLQPEAPKTIVETETPATDKVASLPKTEEPQEEVSSTPSDKAEVVTPTSAEKETANKKAEASPKKEEAKEVDSKE  
 SNTDKTDKDKPAKKDEAKAEADKPATEAGKERAATVNEKLAKKKIVSIDAGRKYFSPEQLKEIIDKAKHYGYTDLHLL  
 VGNDGLRFLMDDMSITANGKTYASDDVKRAIEKGTNDYNDPNGNHLTESQMTDLINYAKDKIGLIPTVNSPGHMDA  
 ILNAMKELGIQNPNSFYFGKKSARTVDLDNEQAVAFKALIDKYAAYFAKKTEIFNIGLDEYANDATDAKGWSVLQAD  
 KYYPNEGYPVKGYEKFIAYANDLARIVKSHGLKPMFNDGIYNSDTSFGSFDKDIIVSMWTGGWGGYDVASSKLLAE  
 KGHQILNTNDAWYYVLRNADGGQWYNLDQGLNGIKNTPIITVPKTEGADIPHGMVAAWADTPSARYSPSRLFKLM  
 RHFANANAIEYFAADYESAEQALNEVPKDLNRYTAESVTAVKEAEKAIRSLDSNLSRAQQDTIDQAIKLOETVNNLT  
 PEAQKEEEAKREVEKLAKNKVISIDAGRKYFTLNQLKRIVDKASELGYSDVHLLGNDGLRFLDDMTITANGKTYASD  
 DVKKAIEGTAKAYYDDPNGTALTQAEVTELEIEYAKSKDIGLIPAINSPGHMDAMLVAMEKLGKPNQAHFDKVSCTTMD  
 LKNEEAMNFVKALIGKYMDFAGKTKIFNFGTDEYANDATSAQGWYYLKWYQLYGKFAEYANTLAAMAKERGLQPM  
 AFNDGFYIEDKDDVQFDKDLVISYWSKGWGWYNLSPQYLASKGYKFLNTNGDWYYILGQKPEDGGGFLKKAIENT  
 GKTPFNQLASTKYPEVDLPTVGSMLSIWADRPSAEYKEEIEFELMTAFADHNKDYFRANYNALREELAKIPTNLEGYSK  
 ESLEALDAAKTALNLYNLNRNKQAEIDTLVANLKAALQGLKPAVTHSGSLDENEVAANVETRPETITRTEIIPFEVIKKEN  
 PNLPAQENIITAGVKGERTHYISVLTENGKTTETVLDSQVTKEVINQVVEVGAPVTHKGDESGLAPTTEVKPRLDIQEE  
 EIPFTTVCENPLLLKGKTQVITKGVNGHRSNFYSVTSADGKEVKTLVNSVVAQEAQVQIVVEVGTMTVTHVGDENGQA  
 AIAEEKPKLEIPSPAPSTAPAEESKVLQDPAPVVTEKLPETGTHDSAGLVVAGLMSTLAAAYGLTKRKED

#### **ID122 825bp**

(SEQ ID NO: 167)

ATGAACAAAAAACAAGACAGACACTAATCGGACTGCTAGTGTTATTGCTTTTGTCTACAGGGAGCTATTATATCA  
 AGCAGATGCCGTCGGCACCTAATAGTCCCAAAACCAATCTTAGTCAGAAAAAACAAGCGTCTGAAGCTCCTAGTCA  
 AGCATTGGCAGAGAGTGTCTTAACAGACGCAGTCAAGAGTCAAAATAAAGGGAGTCTGGAGTGAATGGCTCAGG  
 TGCTTTTATCGTCAATGGTAATAAAAAACAATCTAGATGCCAAGGTTTCAAGTAAGCCCTACGCTGACAATAAAAA  
 AAGACAGTGGGCAAGGAACTGTTCCAACCGTAGCTAATGCCCTCTGTCTAAGGCCACTCGCTCAGTACAAGAATC  
 GTAAAGAAACTGGGAATGGTTCAACTTCTTGGACTCCTCCAGGTTGGCATCAGGTCAAGAATCTAAAGGGCTCTTA  
 TACCCATGCAGTCGATAGAGGTCAATTGTTAGGCTATGCCTTAATCGGTGGTTTGGATGGTTTGTATGCCTCAACAA  
 GCAATCCTAAAAACATTGCTGTTTACAGACAGCCTGGGCAATCAGGCACAAGCCGAGTATTCGACTGGTCAAAACTA  
 CTATGAAAGCAAGGTGCGTAAAGCCTTGGACCAAAACAAGCGTGTCCGTTACCGTGTAAACCTTTACTACGCTTCA  
 AACGAGGATTTAGTTCCCTCAGCTTACAGATTGAAGCCAAGTCTTCGGATGGAGAATTGGAATTCATGTTCTAG  
 TTCCCAATGTTCAAAAGGGACTTCAACTGGATTACCGAACTGGAGAAGTAACGTAACTCACTAGTAA

(SEQ ID NO: 168)

MNKKTRQTLIGLLVLLLLSTGSYYIKQMPSAPNSPKTNLSQKKQASEAPSQALAESVLTDVKSQIKGSLEWNGSGAFIV  
 NGNKTNLDAKVSSKPYADNKTKTGKETVPTVANALLSKATRQYKNRKETGNGSTSWTPPGWHQVKNLKGSYTHAV  
 DRGHLLGYALIGGLDGFDASTSNPKNIAVQTAWANQAQAEYSTGQNYYESKVRKALDQNKRVRYRVTLYYASNEGLV  
 PSASQIEAKSSDGELEFNVLPNVQKGLQLDYRTGEVTVTQ

#### **ID123 225bp**

(SEQ ID NO: 169)

GTGCTAAGATTACAGCGGATTGAGGCAAGTGATGAAGATGAATAAGAAATCAAGCTACGTAGTCAAGCGTTTACTTT  
 TAGTCATCATAGTACTGATTTAGGTACTCTGGCTCTAGGAATCGGTTAATGGTAGGTTATGGAATCTTGGGCAAG  
 GGTCAAGATCCATGGGCTATCCTGTCTCCAGCAAAATGGCAGGAATTGATTCAAAATTTACAGGAAATTAG

(SEQ ID NO: 170)

VLRFSGLRQVMKMNKSSYVVKRLLLVIIVLILGTLALGIGLMVGYGILGKGQDPWAILSPAKWQELIHKFTGN